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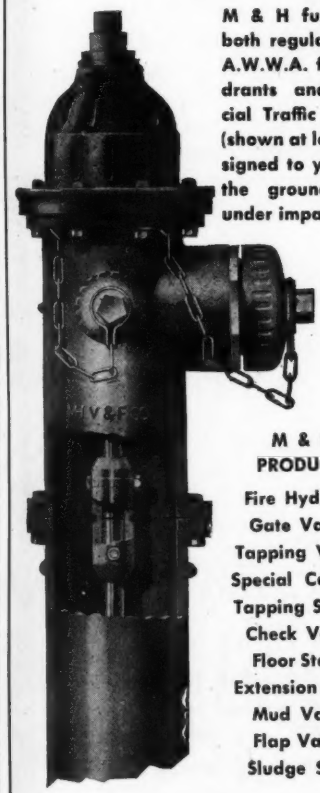

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Vol. 75 No. 4

A. PRESCOTT FOLWELL, Editor

APRIL CONTENTS

HIGHWAYS

Wartime Highway Maintenance. *By Geo. E. Martin* 11
Care and Maintenance of "Off-the-Road" Tires 18
Luminescent Directional Signs 20
When to Paint Traffic Lines 28
Newton, Mass., Bridges and Curbs 28
Highway Base Stabilization in Great Britain 34
Beaded Traffic Stripes in Rhode Island 40

SEWERAGE AND SANITATION

What the Engineer Should Know About Tropical Diseases 14
A Storage Lagoon for Wastes From Canning Company Plants. *By Frank O. Jones* 21
A Biorobic Gremlin at the Sewage Plant 26
City Refuses to Handle Wastes That Stall Sewage Plant 32
Rats in Garbage Dumps 34
Portland's Postwar Sewerage Plans 40
The Sewerage Digest 53

WATER SUPPLY AND PURIFICATION

Well Troubles: Their Causes and Cures 16
Insufficiency of Backwashing Facilities Necessitates Remodeling Ten Filters. *By Baxter F. Wade* 23
Cement Painting of Asphalt Reservoir Lining 30
Pushing Iron Pipe Across a Swamp 40
Water Works Engineering in Disaster 46
The Water Works Digest 49

THE WAR EMERGENCY 7

Changes in WPB Orders Re Clay Sewer Pipe and Steel Pressure Pipe
Enemy-Owned Patents Offered to American Manufacturers
Plans for Postwar Highway Work Urged
Loan of Army Highway Equipment to State Departments
Extra-Heavy Cast-Iron Pipe Permitted
Postwar "Planning" and Blue Printing

GENERAL

Necessity for Immediate Federal Planning for Postwar Work 20
New A.S.A. Standards for the Public Works Field 32
Local Responsibility for Public Works 34
Michigan Appropriates Five Million to Local Governments For Planning. 34
Keeping Up With New Equipment 57
Reader's Service Department 63

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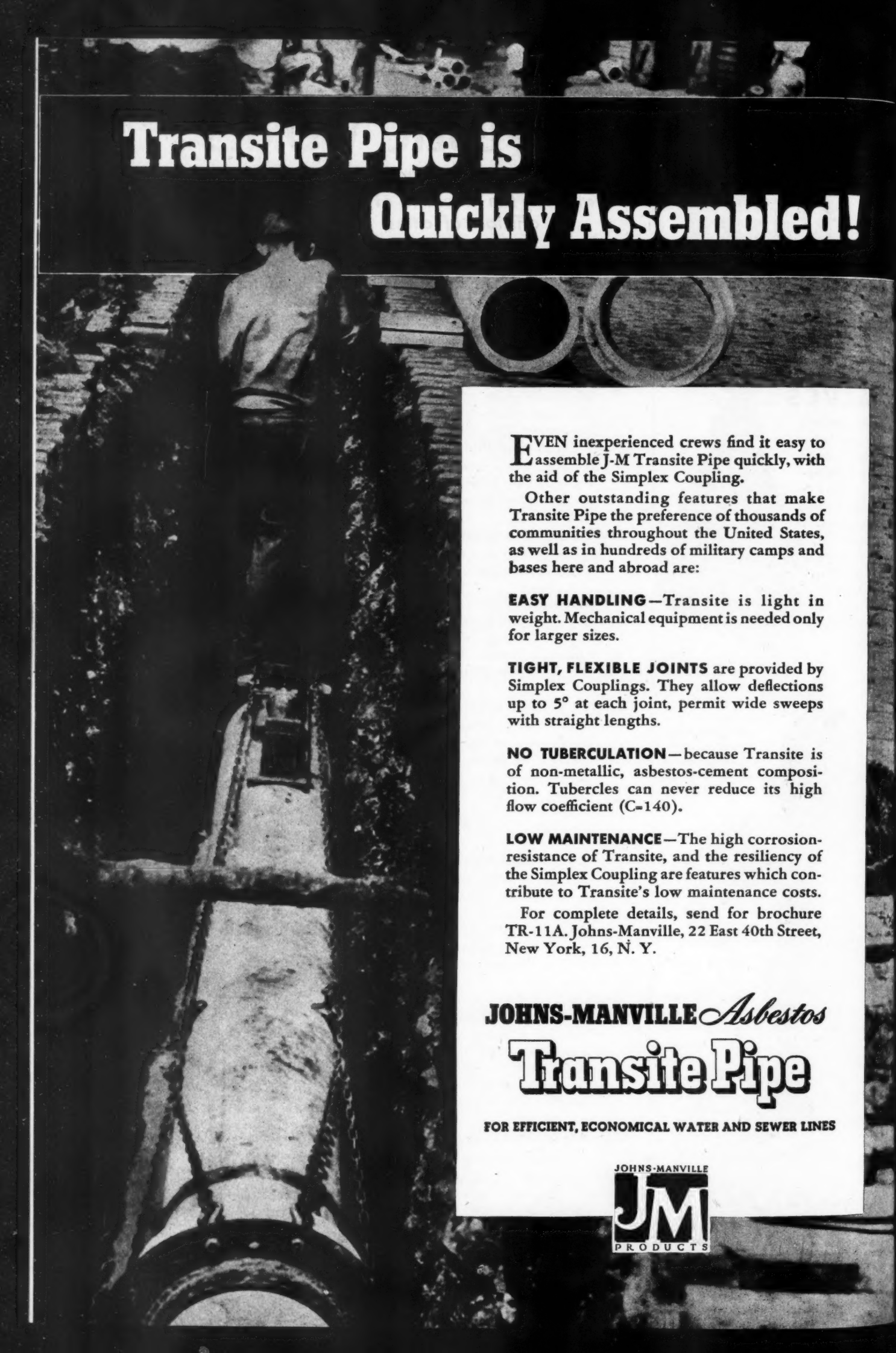

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THE WAR EMERGENCY

Changes in WPB Orders Re Clay Sewer Pipe and Steel Pressure Pipe

Vitrified clay sewer pipe not conforming with the simplified practices established by Order L-316 may be manufactured only when authorized by the War Production Board, according to L-316 as amended March 10. Such authorization will be granted only to fill specific purchase orders for pipe needed to dispose of existing inventory of non-conforming pipe. Application for authorization is made by letter, specifying the purchase order, quantity of pipe in inventory and additional quantity that must be manufactured. The amended order also makes some dimension changes in the specifications for pipe and fittings to meet trade conditions in various parts of the country. Chief among these is the permitted manufacture of 2-foot length in 8, 10 and 12-inch diameter for standard-strength pipe. Additional sizes now permitted will to a great extent eliminate the necessity for appeals.

Specifications for the manufacture of steel pressure pipe have been modified to bring them into conformity with recent changes in basic pressure pipe specifications, the War Production Board announced March 11. These changes are made in an amendment to Schedule 11 of Limitation Order L-211, which contains the specifications for steel pressure pipe which in turn are based on specifications established by the American Society for Testing Materials. The Society has recently amended the basic specifications upon which L-211 standards are based, and, consequently, the order has been amended to bring it up to date.

Enemy-Owned Patents Offered to American Manufacturers

Approximately 45,000 patents and pending patent applications formerly owned in enemy countries have been seized by the Alien Property Custodian, and any American manufacturer can obtain a license to use them on a nonexclusive basis by paying an administration fee of $15 for each patent licensed.

Among the patents that would seem to be most interesting to the public works field are those listed as follows: Earth boring, 52 patents, Class No. 255. Excavating, 45 patents, Class No. 37. Hydraulic and earth engineering, 222 patents, Class No. 61. Internal combustion engines, 955 patents, Class No. 123. Joint packings, 9 patents, Class No. 288. Land vehicles, dumping, 16 patents, Class No. 298. Pipe joints or couplings, 75 patents, Class No. 285. Pipes and tubular conduits, 49 patents, Class No. 138. Pumps, 339 patents, Class No. 103. Roads and pavements, 51 patents, Class No. 94. Sewerage, 6 patents, Class No. 182. Valved pipe joints or couplings, 5 patents, Class No. 284. Valves, 113 patents, Class No. 251. Water distribution, 175 patents, Class No. 137. Wells, 9 patents, Class No. 166.

Those wishing classified lists of patents can obtain same by writing to the "Office of Alien Property Custodian, Chicago 3, Ill.", specifying the class numbers of the patents desired and enclosing 10 cts. for each class. Printed copies of the patents themselves can be obtained from the Commissioner of Patents, U. S. Patent Office, Washington 25, D. C., for 10 cts. each.

Plans for Postwar Highway Work Urged

At its recent annual meeting, the Association of Highway Officials of the North Atlantic States adopted resolutions urging states, counties and municipalities "to expedite with the greatest possible speed the preparation of detailed engineering designs and estimates for postwar highway projects in accordance with standards as approved by the State Highway Departments, including plans for their sound financing" and to plan, so far as possible, for financing them "from their own funds or through well-conceived and fairly administered Federal aid."

Loan of Army Highway Equipment to State Departments

Highway maintenance equipment, repair parts and maintenance supplies in the hands of the Army may be made available for use by state and local agencies, under the terms of a recent directive issued by Lt. Gen. Brehon B. Somervell, Commanding General, Services of Supply.

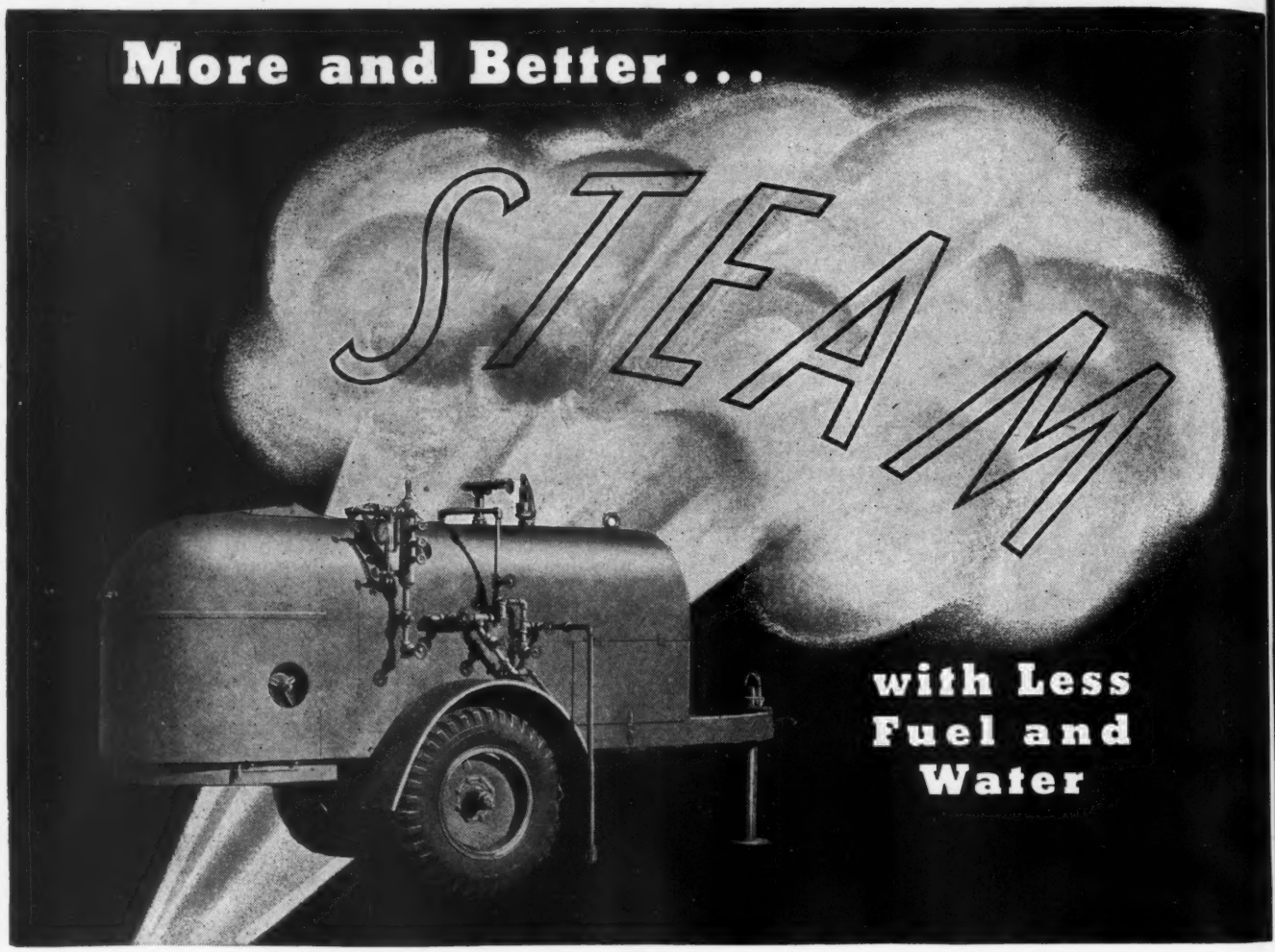
The order permits such assistance only in "emergencies," and refers specifically to state highway departments. Other agencies may be eligible for assistance under a broadened interpretation. Requests are transmitted from the state highway departments to the Public Roads Administration, and then to the Commanding General of the Service Command for action.

Extra-Heavy Cast-Iron Pipe Permitted

Production of extra heavy cast-iron pipe—prohibited since June 1, 1942—is now permitted. Victory weight pipe has been found unsatisfactory for certain uses.

Postwar "Planning" and Blue Printing

Every mail brings news that some state, county or city is "planning" large amounts of postwar work—roads, bridges, sewers, waterworks, etc.; but most of these plans have advanced little beyond the desire or hope stage. However, there are some outstanding exceptions. Illinois reports that plans have been completed or are in preparation for $121,368,700 worth of work, of which $103,000,000 is for highway work. Sixty percent of that State's counties report plans and specifications completed or in preparation for more than $40,000,000 of work. Michigan has 24 survey crews at work obtaining data for $96,000,000 of highway work and 100 other men are drawing plans and construction details.



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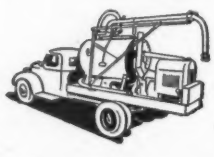
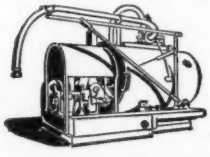
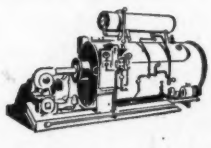

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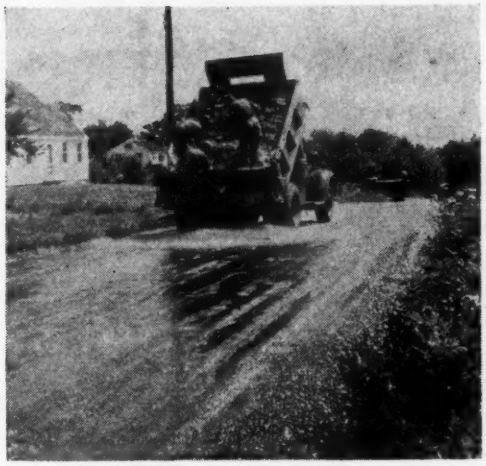
Vol. 75. No. 4

Wartime Highway Maintenance

By GEO. E. MARTIN

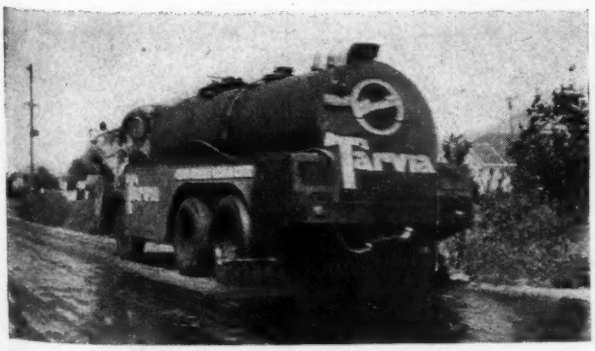
Consulting Engineer, Paving Materials Sales, The Barrett Division, Allied Chemical & Dye Corp.



Covering surface treatment.

How combinations of road tar, no longer a critical material, and aggregate can be used by proven methods for the maintenance and repair of highways, by surface treatment, patching and resurfacing.

TRANSPORTATION of any goods from factory or farm to the consignee requires the use of highways for at least a part of the haul. Most war plants are dependent upon them for moving raw materials, parts and labor into the plant as well as moving the finished product out. As a whole, our highway system has performed this service well, but some roads have broken down under the excessive load of war traffic, generally sections that have been subjected to traffic and loads that were not anticipated when the roads were built. Should such highway failures become widespread it would be a most serious matter, and prevention of it calls for the most effective maintenance and the strengthening of weak spots before they break. Under normal conditions, a number of highways are resurfaced each year, but this has not been possible during the war and this increases the maintenance burden.



Distributing tar for surface treatment.

Although most of the traffic moves over the main thoroughfares, the secondary or feeder roads must not be neglected, for much of the traffic movement originates or terminates over them. The problem therefore is a responsibility of county and other local road units as well as of state highway departments.

Fortunately, although the labor problem will probably continue to be serious, materials can be obtained without too much difficulty. The near completion of the various war construction projects has released bituminous materials for other purposes, so that certification by the Public Roads Administration is no longer required for purchasing them. Some of the tested and proven methods of combining tar and aggregate and using the combinations in highway maintenance and repair will be discussed in this article.

Fourteen grades of road tar have been standardized during the past few years by the American Association of State Highway Officials, the American Society for Testing Materials and the Federal Specification Board, and have been adopted by many state highway departments. The grades as as follows:

RT-1 to RT-4—Used for prime coats.

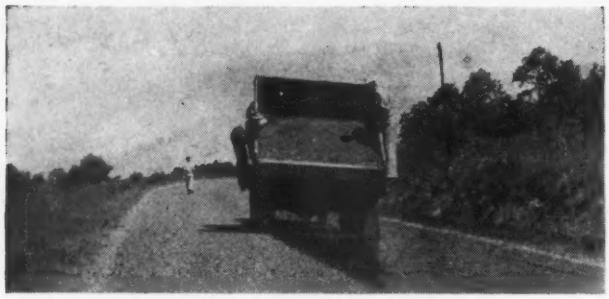
RT-5 and RT-6—Used for road mixes.

RT-7 to RT-9—Used for hot surface treatments.

RT-10 to RT-12—Used for binders in plant mixes.

RTCB-5 and RTCB-6—Used for binders in patching mixes.

The uses overlap. For example, some customers use RT-3 for surface treatments while others use up to RT-10 and RT-11. RT-4 is sometimes used for road



Spreading cover on surface treatment.

mixes and RT-7 to RT-9 are commonly so used. A general rule is to use the heaviest (highest RT number) materials which can be satisfactorily handled on the job. This will of course depend upon climate and temperature, type and grading of aggregate, and machinery available.

Aggregate sizes have been standardized and published as Simplified Practice Recommendation R163-39. The sizes most commonly used in maintenance operations are as follows:

Coarse Aggregate Sizes

		Amounts finer than each laboratory sieve (square openings) % by weight									
Size No.	*Nominal Size Square Openings*	*2½ in.*	*2 in.*	*1½ in.*	*1 in.*	*¾ in.*	*½ in.*	*⅜ in*	*No. 4*	*No. 8*	*No. 16*
3	2″ to 1″	100	90 to 100	35 to 70	0 to 15	...	0 to 5				
5	1″ to ⅜″	...	...	100	90 to 100	40 to 75	15 to 35	0 to 15	0 to 5		
68	¾″ to No. 8	...	...	...	100	90 to 100	...	30 to 65	5 to 25	0 to 5	
79	½″ to No. 8	...	...	...	...	100	90 to 100	40 to 75	5 to 25	0 to 5	
8	⅜″ to No. 8	...	...	...	...	...	100	85 to 100	10 to 30	0 to 10	
9	No. 4 to No. 16	...	...	...	...	...	...	100	85 to 100	10 to 40	0 to 10

Tar and aggregate are combined in several ways to form the finished maintenance material. They are as follows:

Surface Applications. Tar-Coated Aggregate:

Patching mixtures.

Road mixes.

Penetration macadam.

Cold-lay tar concrete.

Hot-lay tar concrete.

Normal maintenance operations on the pavement proper may be grouped under—

Patching.

Surface treatment.

Re-surfacing.

Tar-coated aggregate is used for patching and re-surfacing, and the surface applications for surface treatments.

Surface Applications and Surface Treatments

Surface treatments are used to renew the wearing surface on pavements. They also serve to water-proof the top of the road and shed the water to the sides of the road. Tars can be used for the treatment of any highway surface except an earth road.

Grades of Tar—Almost all of the tar grades are used for surface treatments. The heavier grades are used in warm climates, and the lighter ones in the colder climates. Grades RT-1 to RT-4 are used for prime coats.

Prime Coat—All roads which do not have a bituminous or similar surface should receive a tar prime coat as a part of the surface treating operation.

The road surface should be properly shaped before the application of the prime coat. Very hard surfaces, like water-bound macadam, should be swept before the application of the prime coat, while looser surfaces, like gravel and sand-clay, need not be swept. The road may be damp, but should not be wet.

As much tar should be used as will be absorbed by the road, and no more. This will usually be from one-quarter to one-half gallon per square yard.

If possible, the tar should be permitted to penetrate into the road undisturbed by traffic for twenty-four hours. Under these circumstances, no covering material need be used. If traffic must be carried over the road, a light sand cover should be spread over the tar to prevent picking up under traffic. Not more than five pounds per square yard will be needed.

Seal Coat—A tight, clean, dry surface should be provided for the seal, so that the tar has an opportunity to adhere tightly to the surface underneath. Loose dirt and dust should be removed by sweeping.

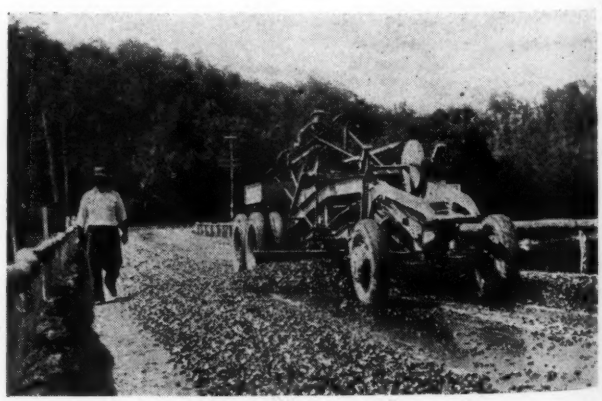
For a single seal coat the amount of tar will vary from one-quarter to one-half gallon per square yard, while for a double seal coat the total amount may be as much as three-quarters gallon per square yard.

Covering material is an important factor in the success of any surface treatment. The size selected will depend upon the effect desired, the condition of the road to be treated, traffic and the grade of tar used.

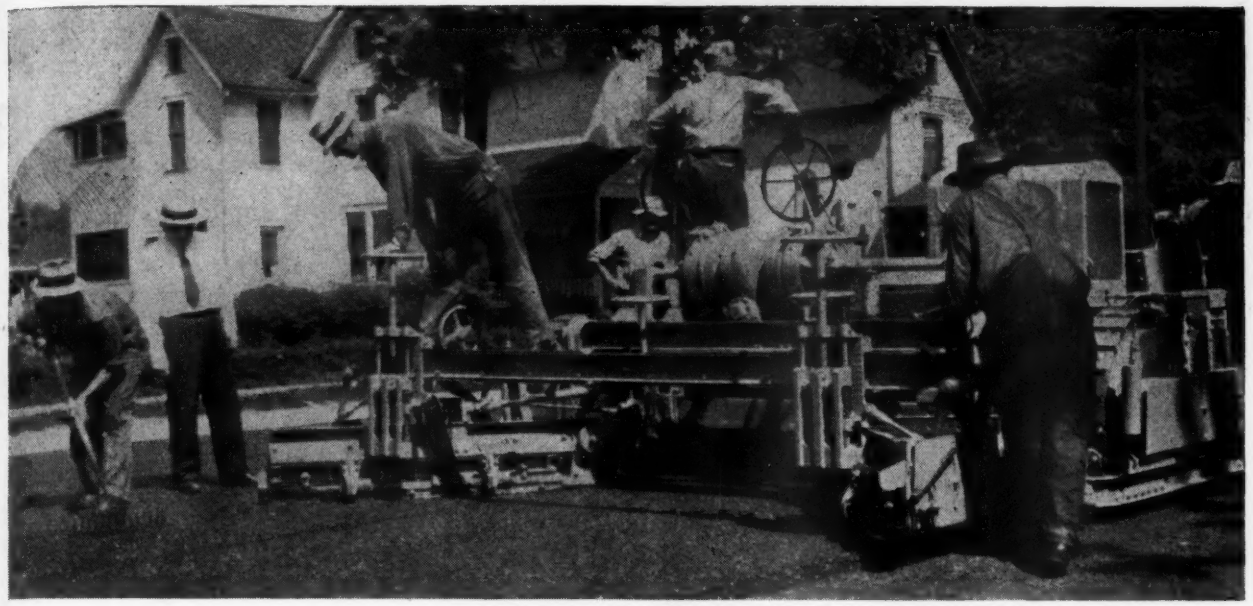
The amount of cover will be in the vicinity of ten pounds for each one-tenth gallon of tar. However, this should be reduced somewhat if the treatment is placed over a surface which will absorb the tar, and should be increased over a very tight, hard surface.

Cover should be spread uniformly over the tar while it is yet warm. Sweeping or dragging with a broom drag will insure the uniform distribution of the cover. Rolling will set the cover into the tar and prevent its being displaced by traffic.

Traffic should be slowed down to a reasonable speed for about a week on fresh surface treatments to prevent undue displacement of the covering material before the tar has had a chance to set.



Mxing tar and aggregate.



Resurfacing with tar concrete.

Typical surface treatments are shown in the following tabulation:

PRIME TAR	SEAL First Application TAR		SEAL First Application COVER		SEAL Second Application TAR		SEAL Second Application COVER	
Gals. per Sq. Yd. Amt.	*Grade*	*Gals. per Sq. Yd. Amt.*	*Grade*	*Lbs. per Sq. Yd. Amt.*	*Grade*	*Gals. per Sq. Yd. Amt.*	*Grade*	*Lbs. per Sq. Yd. Amt.*	*Grade*
0.3	RT-2	0.3	RT-5	28	9	..	....	..	....
0.2	RT-3	0.3	RT-6	28	8	..	....	..	....
..	....	0.3	RT-8	30	79	..	....	..	....
..	....	0.25	RT-9	25	68	.02	RT-9	15	9

Patching

Preliminary Preparation—The holes to be patched should be cleaned to remove all dust, dirt and loose material. A blow torch may be used to dry the hole before the patching material is placed. The side of the hole over which traffic passes from the existing pavement to the patch should be cut so that the side will stand vertically. Although not so necessary, the other sides may also be cut in the same manner.

Patching Mixtures—The binder will generally be RTCB-5 or RTCB-6. Aggregate approximating the grading of No. 68 should be used. With hard stone, such as trap rock, it is necessary to add from ten to twenty per cent of fine aggregate in order to reduce the voids. This may not be necessary with a soft stone which breaks during handling. The top size of the aggregate may be reduced below one inch for patching shallow holes. Sufficient tar must be used to coat all of the aggregate but not sufficient to run off the aggregate when the mix is placed in piles. In general, from fourteen to sixteen gallons of tar to a cubic yard of aggregate will be correct. Too much tar will cause the patch to push out of shape under traffic, while too little will produce a patch which will ravel. Too little is better than too much, however, since the former difficulty can be corrected by the seal coat.

Rolling tar patching mix.

The aggregate should be clean and dry when mixed with the tar. In cold weather it will assist in the mixing to heat the aggregate; however, it should not be heated above 100°F.

Any ordinary concrete mixer can be used for making the patching mixture. Aggregate, tar and fine aggregate should be placed in the mixer in the order named. The mixer should be loaded to only about eighty per cent of its rated capacity for cement concrete. The mixing should continue until all of the aggregate is coated with tar, which will usually require about two minutes.

The mix may be used immediately, although it will be tougher if allowed to cure in a pile for a few days. The mix can be stored in piles for several months and still be in good condition.

Road Mixes—Road-mixed patching material may be prepared on an unused section of highway and then hauled to the job. The preparation of the road mix is the same whether it is to be used for patching or re-surfacing.

(Continued on page 42)

Distributing larvicide by power sprayer from a boat

What the Engineer Should Know About Tropical Diseases

AMERICAN troops are fighting in tropical areas that many of us had never heard about a couple of years ago. There has been much discussion of the danger that our returning soldiers may bring back to this country some of the tropical diseases from overseas, and that these diseases will present our health authorities with really serious problems. Little has been written for engineers on this subject to tell them what part they will have in post-war disease control, if such a problem does arise.

The diseases most generally discussed at this time may be grouped by their method of transmission as follows: *a*—those that are spread by certain varieties of mosquitoes—malaria, yellow fever, and filariasis or elephantiasis; *b*—those spread through food or water—amebic dysentery and cholera; *c*—typhus fever, of which there are two forms, one spread by lice and one by rat fleas; *d*—plague, also spread by rat fleas, and *e*—schistosomiasis, which is contracted by swimming or wading in water in which snails of a certain type live. These various groups of diseases will be considered from the viewpoint of the engineer.

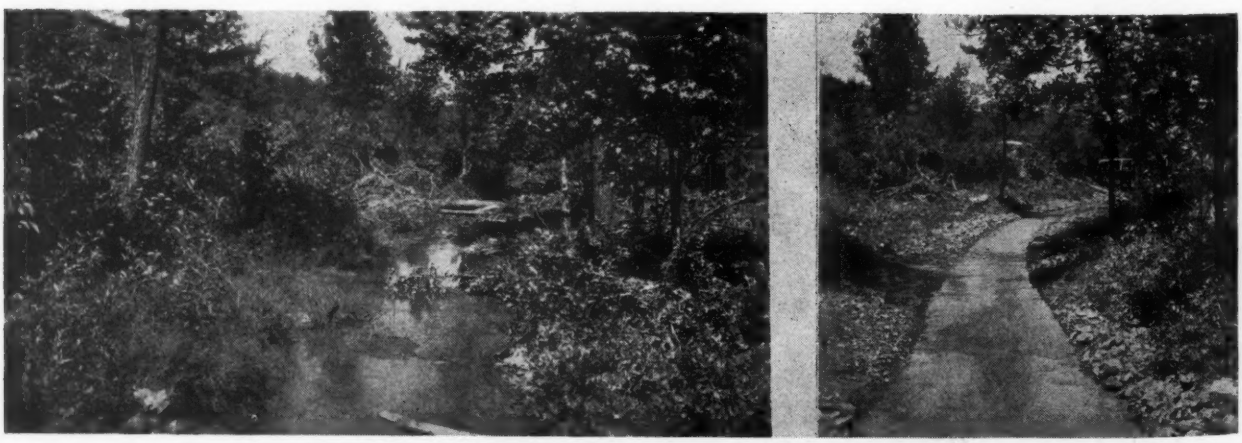
The Mosquito-Borne Diseases

Malaria is by far the most important disease of those mentioned as a cause of hospital admissions and lost time for troops overseas. The Southwest Pacific, Central Africa and India and Burma are the most malarious areas in the world. Southern Europe is heavily malarious, including Sicily, Italy and the Balkans. In our Southern States, malaria has always been one of our most important diseases, though few recognize the fact or have taken the time to learn the simple steps in control.

Malaria is transmitted through the bite of the Anopheles mosquito. The cycle of transmission is as follows: a female mosquito bites a person infected with malaria and in whose blood there are malaria parasites; the parasites taken up by the mosquito in the course of biting develop in the mosquito, and after 10 or 12 days the mosquito can transmit them to a well person by biting. Since there are anopheles mosquitoes, theoretically able to transmit malaria, in nearly all sections of the United States, there is a possibility that a focus of malaria may develop in any place where a returning soldier with malaria parasites in his blood decides to locate.

The situation, however, is not really as serious as it may seem. Most soldiers will have been cured before discharge from the Army. The uncured will likely represent a very small proportion of the population in any area. In the South, where quite a considerable proportion of the population already carry malaria parasites, the increase in percentage of population will not be large. In the North and East, our most populous areas, climatic conditions are not very favorable to the development of malaria. Factors militating against spread of malaria in temperate areas include the relatively short mosquito breeding season, the lengthened cycle of development of the parasite in the mosquito, and the small percentage of infected population. These safety factors should not blind us to the possibilities of danger; but the fact that there has been much migration of people from malarial areas of our own South into the North, without serious epidemics, should indicate there is no need for undue alarm.

Yellow fever visited this country repeatedly in the past, and with disastrous results. While the Aedes aegypti mosquito, which is the carrier of yellow fever, is one of the most common pests, the significant de-



A typical mosquito-breeding area, before and after channeling creek.

ineould Know About Tropical Diseases

What diseases are most likely to be brought here by returning soldiers, how they are transmitted, and what part the engineer can play in controlling them.

velopment and spread of yellow fever in the United States as a result of the war is highly unlikely. First, all soldiers going overseas are inoculated against this disease; second, our health officials know the exact methods of controlling the disease; and, third, the Aedes aegypti mosquitoes in a community can be quite easily eradicated if this is necessary.

Filariasis is a disease caused by the presence in the blood of a minute worm that is transmitted by the bite of an infected mosquito. It is unlikely that this disease will be brought back to this country to an extent that may present a significant health hazard. In the past, there have been numbers of persons entering this country from filariasis infected areas without creating epidemics.

Army doctors are familiar with the methods of spread of these diseases. Patients suffering from any of them are protected against the bites of mosquitoes, the Army Hospitals in this country being well screened. In addition, as an added safeguard, careful mosquito control operations are carried on around those hospitals where patients from overseas with mosquito-borne diseases are treated.

Mosquito control, that is, eradication of mosquitoes, is one phase of controlling mosquito-borne diseases, but other factors also are important, and the doctor and the engineer have joint responsibilities. The discussion here will be limited to the essentials of engineering work, because it has been prepared for engineers, but it must be remembered that in controlling these diseases, medical treatment and keeping the patient behind screening while he is infective are highly important.

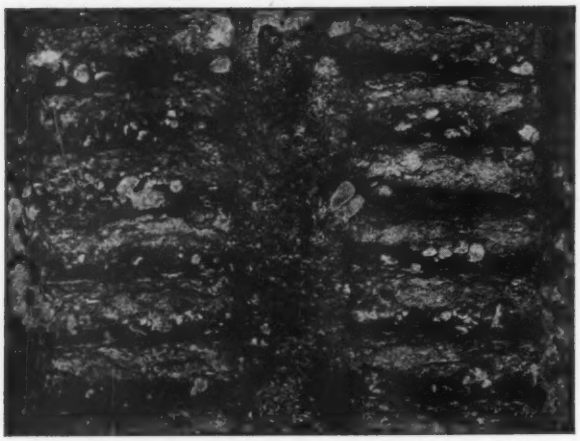
The principal methods of mosquito control are drainage, filling, and the use of larvicides. The first three of the four cycles in the life of a mosquito (the cycles are egg, larva or wiggler, pupa or tumbler, and adult) are spent in water, and normally require 7 or 8 days. Drainage or filling eradicate the pools of water in which mosquitoes may breed. Larvicides, such as oil and paris green, are used to kill the larvae and pupae, either by forming a film on the water surface or by poison. A comprehensive mosquito control program includes the organization of personnel and equipment to eliminate as much as possible of mosquito-breeding water surfaces, and to treat, so as to prevent breeding, all areas not drained. Such work is clearly engineering in nature.

After ditch lining has been placed.

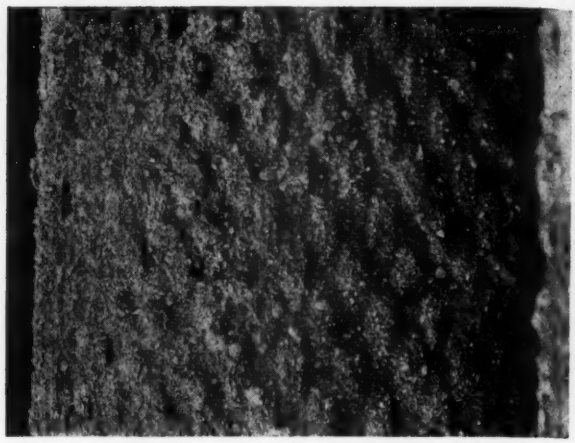
Using trench hoe for channeling.

Detailed information will not be given here in regard to mosquito control engineering, as much has been published on the subject in recent years. If specifically requested in letters to the Editor by a sufficient number of engineers, consideration will be

(Continued on page 44)



An iron screen badly corroded by direct corrosion. It is also incrusted with the voluminous iron oxide or rust which has embedded many pebbles and grains of sand and practically shut off the openings.



In about one year, this perforated screen was plugged almost solid with the most common type of incrustation. Lack of intake capacity greatly increased the rate of incrustation. Incrustation clogs the formation around the screen as well as the screen itself.

Well Troubles: Their Causes and Cures

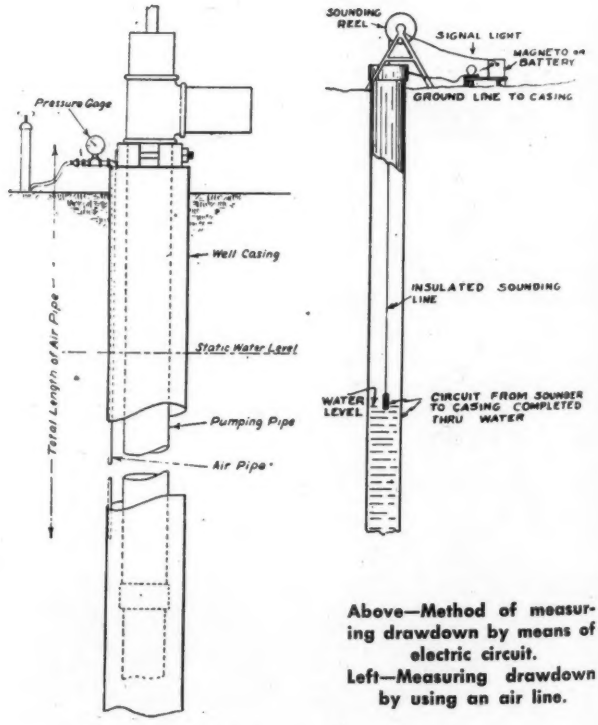
MOST well failures can be classified under one of three heads: 1. Those due to a high rate of pumping or a low rate of replenishment of the ground-water storage, indicated by a lowering of the pumping level in the well and decrease in capacity at the same time. 2. Failures due to the screens in the well becoming incrusted or corroded, indicated by increased drawdown in the well or the pumping of sand. 3. Failures due to faulty well construction, indicated by mechanical failure of the well or by contamination of the water being pumped.

Limiting Withdrawal to Capacity

For a time water can be pumped from a ground-water storage at a higher rate than it is being supplied to it, but this must ultimately lead to a partial failure of the well. The remedy or prevention of such a failure is to keep the pumping rate within the safe yield of that area. This of course necessitates knowing what the safe yield is.

The easiest way to do this involves keeping a continuous record of the quantity of water pumped, the pumping level and the static level in the well. Every well of any consequence should have an air line on it if possible, by means of which the static and pumping levels can be measured. If, with a uniform rate of pumping, the pumping level falls lower day after day, that rate exceeds the rate of replenishment and must be reduced at least to the point of equilibrium. Otherwise failure of the well is inevitable, either from the reduced capacity or from the drawdown being too great for satisfactory pumping.

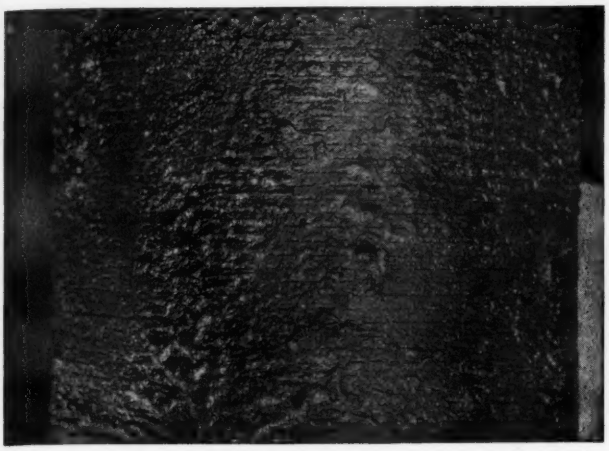
To determine these things, the record of the well's performance must be kept for a considerable length of time and the trend of the pumping and static levels noted in connection with the rate of pumping.



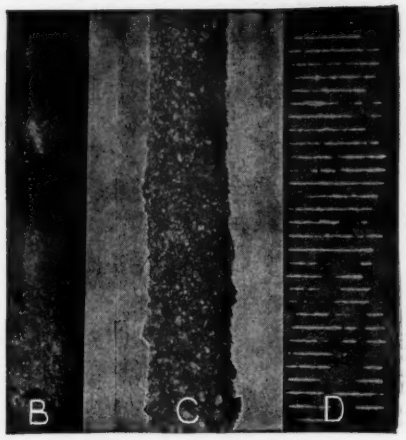
Above—Method of measuring drawdown by means of electric circuit.
Left—Measuring drawdown by using an air line.

Failure of Screens

Whether a screen is corroded or incrusted, the result is either partial or total failure of the screen. Failures of this kind are indicated by a gradual decline of the pumping level accompanied by a falling off in capacity. Due to the nature of the process, there is nothing that can be done to prevent corrosion or incrustation



This is a sample of the type of incrustation which requires double acid treatment for best results. For analysis and details, see text of article.



(B) A good example of direct corrosion in a piece of ordinary pipe. (Pitting). (C) This is incrustation and *not* corrosion, although it is often incorrectly called corrosion. (D) A typical case of selective corrosion and erosion in which a "yellow brass" screen was de-zincified and the soft remaining metal was worn away unevenly at the slots by erosion.

Chief troubles are due to too heavy pumping or clogging of screens. Remedies: keep pumping rate within that of replenishment, or clean the screens. If failure is due to faulty construction, the only remedy may be a new well.

when the chemical agencies causing them are present in the well and the water around it. Very little can be done after corrosion has started except to remove the products of the corrosive process, either by mechanical means, such as brushes, or by using something to loosen or destroy the deposits in the formation and on the screen.

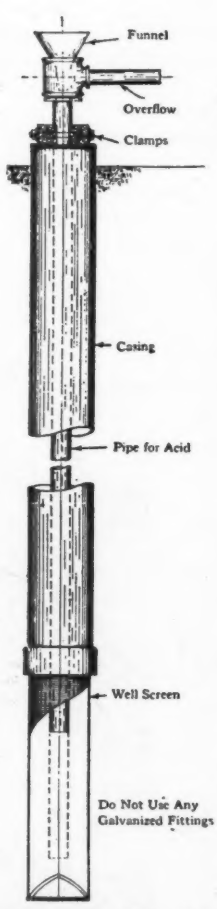
In the case of incrustation, this can often be lessened by reducing the rate of pumping when indication of it first appears; unfortunately, few operators are willing to reduce their pumping rate until compelled to.

Cleaning incrusted or corroded screens is not easy. Several things must be considered carefully, such as the type of screen, the metal of which it is constructed, whether its strength has been impaired by the corrosive action, and the effect of the acid to be used in cleaning. If a corroded screen can be pulled without damage and cleaned at the surface, this is the thing to do, as the screen then can be thoroughly opened up with either acid or brushes, and minor repairs made if necessary. Doing the job with the screen in the ground is more costly and the results obtained are less certain. Cleaning corroded or incrusted screens should never be done without experienced drillers at the job.

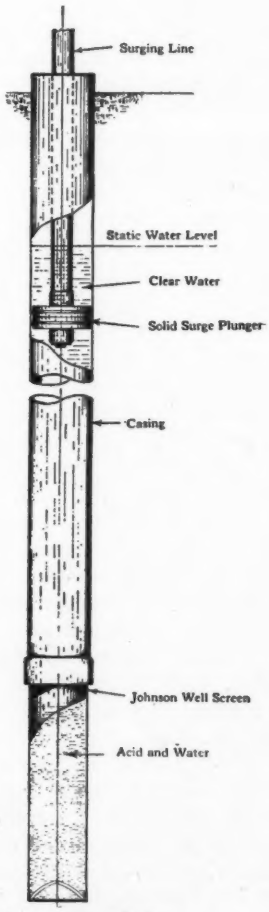
The third class of failures—those due to faulty construction or mechanical failure—are confined mostly to faulty workmanship and connections, poor design as far as strength and slot size are concerned, poorly designed and placed gravel treatments and poorly plugged bottoms. Such failures generally happen suddenly, and are indicated by total loss of the well, collapse of the casing, or the pumping of large quantities of sand.

The first thing to do in case of apparent failure is to check the pump. Three times out of five investigation

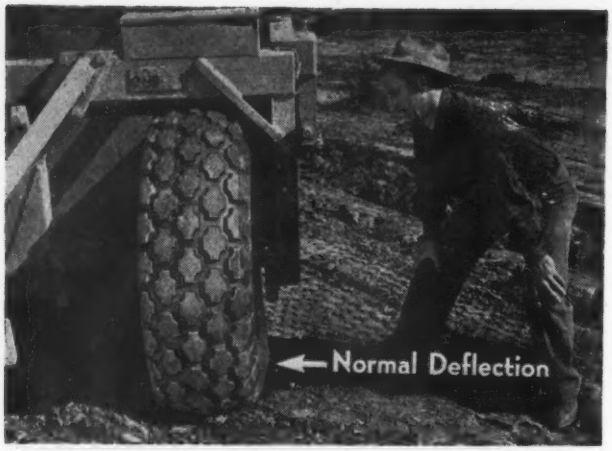
(Continued on page 36)



Common hook-up for putting acid into a well.



Using a surge block or plunger for agitating an acid-treated well.



Normal deflection of an off-the-road type of tire is wider than on highway tires.

The Care and Maintenance of Off-the-Road Tires

THE term "off-the-road-tires" is used to designate tires which do not normally travel on improved roads, and in this article will be considered to mean the tires used on graders, scrapers, and similar maintenance and construction equipment. The care of such tires differs materially in many ways from truck tire maintenance.

The three important factors in proper care of these tires are (1) load, or the amount of weight the tire must support, including that of the vehicle; (2) inflation, or the air pressure in the tire; and (3) the character and condition of the ground over which the tire travels. A fourth factor to consider is speed of travel.

Load.—Accurate determination of the tire load is important. While most earth-moving equipment can be loaded with only a certain number of cubic yards of material, there is a wide difference in weights of materials. Wet sand, for instance, is 20% to 40% heavier than crushed stone; loose dry loam is only 70% as heavy as wet gravel. So the first thing to do is determine definitely the unit weights of the material to be handled and instruct the equipment operator how many yards he may load. Under normal peace-time conditions, a change of tires might make possible an increase in equipment loading; now the loads must be limited to the capacity of existing tires.

As an illustration, an actual set of conditions may be used, where tires are already on the equipment and it is impracticable to replace them with larger tires. The scraper is of 8-yd. struck or 11-yard heaped capacity; it weighs 14,000 pounds; is equipped with four 20 x 16 tires, 16-ply; and will be operated at 10 m.p.h. or less. The materials to be handled are: dry gravel, 2500 pounds per cu. yd.; dry earth, 2050 pounds per cu. yd.; and wet gumbo, 3375 pounds per cu. yd. These weights were determined by actual test. Reference to the table herewith shows that the load capacity for this size tire is 10,110 pounds at 10 m.p.h., and 4 tires will haul 40,440 pounds. Since the vehicle weight is 14,000 pounds, the pay load can be 40,440 — 14,000 = 26,440 pounds.

The scraper will carry 11 cu. yds. when heaped; 11 cu. yds. of dry earth will weigh only 22,550 pounds and the operator can pile on all he can load; 11 cu. yds. of dry gravel will weigh 27,500 pounds, which is too much, and the operator should be told not to pile on all he can load, but to fill the scraper a little less than the maximum; 11 cu. yds. of wet gumbo weigh 37,125 pounds, which is altogether too much; eight yards weigh 27,000 pounds, which is still too much, and the operator should be told to load the scraper slightly less than level full.

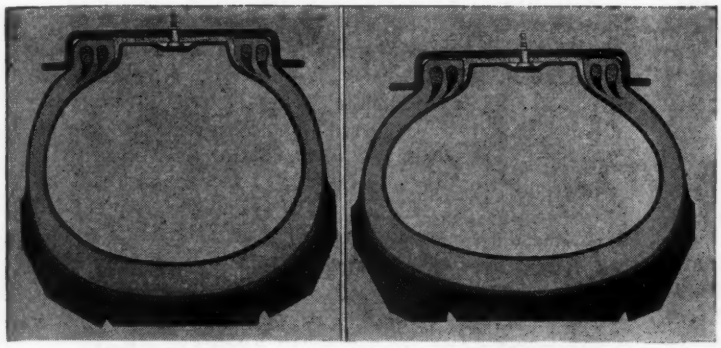
Some scrapers and wagons carry more than half the load on the rear wheels, and larger tires are used on the rear than on the front. The loading on the axles is proportional to the distance of the center of the load from the axles.

Careful supervision of loading on the basis of accurate weights and proper amounts of materials hauled is an essential factor in getting full value out of tires. As the work progresses, periodic checks are necessary to determine if the nature of the material has changed;

Follow a regular maintenance schedule.

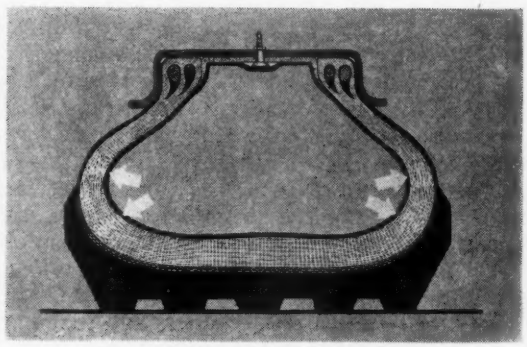
Maintenance of "Off-the-Road Tires"

The three important factors are the load placed on the tire—keep it within the designated capacity; the air pressure in the tire—either too much or too little is seriously detrimental; and the character of the ground on which it runs—it pays to keep this reasonably smooth.



OVERINFLATION **CORRECT INFLATION**

Comparison of shapes assumed by overinflated and correctly inflated tires.



Underinflation distorts the tire body and subjects the cords to excessive strain at the points marked by arrows.

weather conditions, as rain or freezes may alter conditions materially.

Inflating the Tire Properly.—As compared to an automobile or truck tire, an earth-mover tire has a relatively wide deflection under load when properly inflated. The uninstructed operator is consequently very likely to jump to the conclusion that the tire is underinflated and proceed to add more air. Overinflation causes a too narrow contact with the ground, resulting in concentrating the wear on a narrow area of the tread; it also permits less of the road shock to be transmitted to the axle and concentrates the load on a relatively few cords; and it tends to cause the tire to dig or sink into the ground.

SIZES, LOADS AND DIMENSIONS

EARTH MOVER TIRES

Size of Tire	*No. of Plies*	*Size of Rim*	10 mph *Max. Load Lbs.*	10 mph *Lbs. Pressure*	25 mph *Max. Load Lbs.*	25 mph *Lbs. Pressure*	★*Dimensions, New Tires, Inches* *Section Dia.*	*Overall Dia.*	*Loaded Radius*	*Worn Tire Width at Rated Load*
7.50-20	8	5.00S (7″)	3060	50	2740	50	7.95	36.9	17.0	9.0
8.25-20	6	5.00S (7″)	2920	35	2620	35	8.75	38.5	17.7	9.8
8.25-20	8	5.00S (7″)	3380	45	3030	45	8.75	38.5	17.8	9.8
8.25-20	10	5.00S (7″)	3800	55	3400	55	8.75	38.5	17.8	9.8
9.00-20	10	6.00T (8″)	4520	55	4050	55	9.70	39.9	18.3	10.8
10.00-20	12	6.00T (8″)	5090	55	4560	55	10.10	40.6	18.6	11.3
		7.33V (9-10″)					10.63	40.7	18.7	11.9
11.00-20	12	7.33V (9-10″)	5630	55	5050	55	11.20	42.6	19.4	12.5
13.00-20	10	8.37V (11″)	5780	35	5190	35	13.15	45.7	20.6	14.6
13.00-20	14	8.37V (11″)	7150	50	6410	50	13.15	45.7	20.7	14.6
14.00-20	10	8.37V (11″)	6850	35	6140	35	14.10	48.1	21.6	15.5
		10.00					14.75	48.1	21.6	16.3
14.00-20	12	8.37V (11″)	7400	40	6630	40	14.10	48.1	21.7	15.5
		10.00					14.75	48.1	21.7	16.3
14.00-20	16	8.37V (11″)	8940	55	8000	55	14.10	48.1	21.8	15.5
		10.00					14.75	48.1	21.8	16.3
14.00-20	20	8.37V (11″)	9840	65	8800	65	14.10	48.1	21.9	15.5
		10.00					14.75	48.1	21.9	16.3
16.00-20	16	11.25	10110	45	9010	45	17.10	53.5	23.6	18.9
16.00-24	16	11.25	11200	45	9980	45	17.10	57.5	25.6	18.9
18.00-24	12	13.00	11460	30	10230	30	19.50	60.3	26.5	21.6
18.00-24	16	13.00	13580	40	12130	40	19.50	60.3	26.7	21.6
18.00-24	20	13.00	15450	50	13800	50	19.50	60.3	26.9	21.6
36.00-40	34	26.00	55200	35	49200	35	38.70	114.0	50.0	42.7

★Tire dimensions are based on 10 mph load rating.

Damage to the rim may not appear to be harmful. But, the lack of support in the bead area of the tire subjects the cords to abnormal strains and eventually causes failure as shown.

Underinflation is even more harmful to the tire. Heat is generated by the excessive flexing of the underinflated tire under load and in motion. This heat causes deterioration and separation of the elements composing the structure of the tire, so that the side walls are quite quickly destroyed. Bleeding the air from a tire which has become hot and has built up pressure is wrong; the resulting increased flexing of the tire produces more heat and a high pressure, with the temptation to bleed again. When the tire has cooled, underinflation results. The proper practice is to check and correct air pressures when the tire is at atmospheric temperature. Then temperature and pressure will stabilize themselves.

Conditioning the Haul Road.—It pays big money to keep the haul road in fairly good shape. Depressions, chuck holes, sharp rocks, boulders and snags are hard on tires—very hard; and in addition, they waste power, slow up operation and cause abnormal equipment wear. To minimize losses and produce extra tire service, a systematic road patrol system should be established. One road maintainer will save many times its cost of purchase and operation on a job of any magnitude. On smaller jobs, or where a maintainer cannot be obtained, even hand labor will pay big dividends. Chuck holes should be filled; boulders, loose rock and snags should be removed.

Other Factors in Tire Abuse and Conservation.—Spinning a tire by a too-quick start or in an attempt to start or pull a very heavy load on insecure footing results in excessive wear. Locking one drive wheel to make a quick turn is also damaging. Rolling a tire over an obstacle that can easily be avoided is a careless type of abuse. Speeding on the highway must be controlled. Tires are rated for different maximum loads at 10 and 25 m.p.h. A tire carrying a maximum load for the 10 m.p.h. speed should not be driven in excess of that speed, unless it is loaded to the lower weight for 25 m.p.h. Bumping the rear tires against an obstruction to facilitate dumping or for other similar purposes is almost sure to injure the tire. Oil and grease should not be allowed to remain on the tire, nor gasoline be used to clean a tire.

Dual tires of the same rim size should not have a difference in overall up-and-down diameter of more than ¼ inch on tire sizes up to 9.00, and ½ inch on larger sizes. If one of the tires is so worn as to diminish its diameter by more than this amount it will cause trouble. Different air pressures should not be used in an attempt to compensate for unequal diameters. When a new tire is put on a dual wheel, it should be mated with another new tire.

Daily inspections should be made for (1) cut tread or sidewall rubber; (2) breaks in fabric; (3) evidences of careless driving; (4) valve and valve cap condition; (5) wedging of objects between dual tires; (6) correct mating of duals; (7) tread abrasions; (8) defective or damaged rims; and (9) oil or grease on the rubber.

Idle tires should be protected from sun, weather, oil and grease; should be jacked up, air-pressure reduced, and painted every three months with a coating of good tire preservative. Tires can be stored without appreciable deterioration for periods up to three years if proper precautions are carefully observed. The maximum recommended time for storage of tubes is not more than two years. Factors contributing to the deterioration of stored tires and tubes are light, heat, air in motion, oils, dust and dirt, and ozone (which may result from the electrical discharge of motors and generators). Tires should not be stored for any long period in an upright position, but be piled horizontally, one on the other, the height of the piles being so limited that there will be no distortion of the tire at the bottom. Piles should not be located near radiators or other sources of heat. Temperatures should be as low as practicable, with 70° F to 80° F as the maximum.

Before used tires are placed in storage, they should be cleaned, inspected for damage and repaired. New tubes should be left in the original boxes; in case they are not boxed, they should not be inflated for storing. When in tires, the tubes should be inflated just enough to make them remain in the tire. The tire, with the tube inside, can then be stored as previously recommended.

Note: This material was abstracted from a booklet published by The Firestone Tire & Rubber Co., which will be sent to tire users upon request.

Necessity for Immediate Federal Planning for Postwar Work

The League of Wisconsin Municipalities recently issued a statement, saying that the cities and villages of that state generally are actively planning for the postwar period by formulating definite programs and accumulating reserve funds. But it adds:

"There are some fields in which immediate planning at the national level is essential at the present time, because of the fact that it is difficult, if not impossible, for local governments to make their plans until the federal program is formulated. Thus the feasibility, and the decision as to the size, of a municipal airport will depend on whether a city is to be located on main air routes. Similarly local highway plans in many instances are keyed into the federal highway program. It is essential that specific programs for projects of national importance be outlined promptly, and that adequate means be found of supplying this information to municipal officials."

Luminescent Directional Signs

"When the demand by our Armed Forces for such things as luminous maps, luminous airplane dials and luminous directional markers eases off," says *Paint Progress,* "we may well see new and novel peacetime applications which in time will exceed the present war consumption of these finishes." Among the applications suggested are directional and identification signs, street numbers, etc.

There are two types of luminescent coatings in use, known as fluorescent and phosphorescent. The former must be activated by a form of ultraviolet light and have no useful afterglow, and are not suitable for the uses named. The phosphorescent are activated by ordinary light and have a useful afterglow for 2 to 12 hours, and would be the type used for the purposes suggested.

Fairmont lagoon, looking north, just after starting to fill with wastes. Low dikes shown at northwest, north and east. Creek at center on north side.

A Storage Lagoon for Wastes From Canning Company Plants

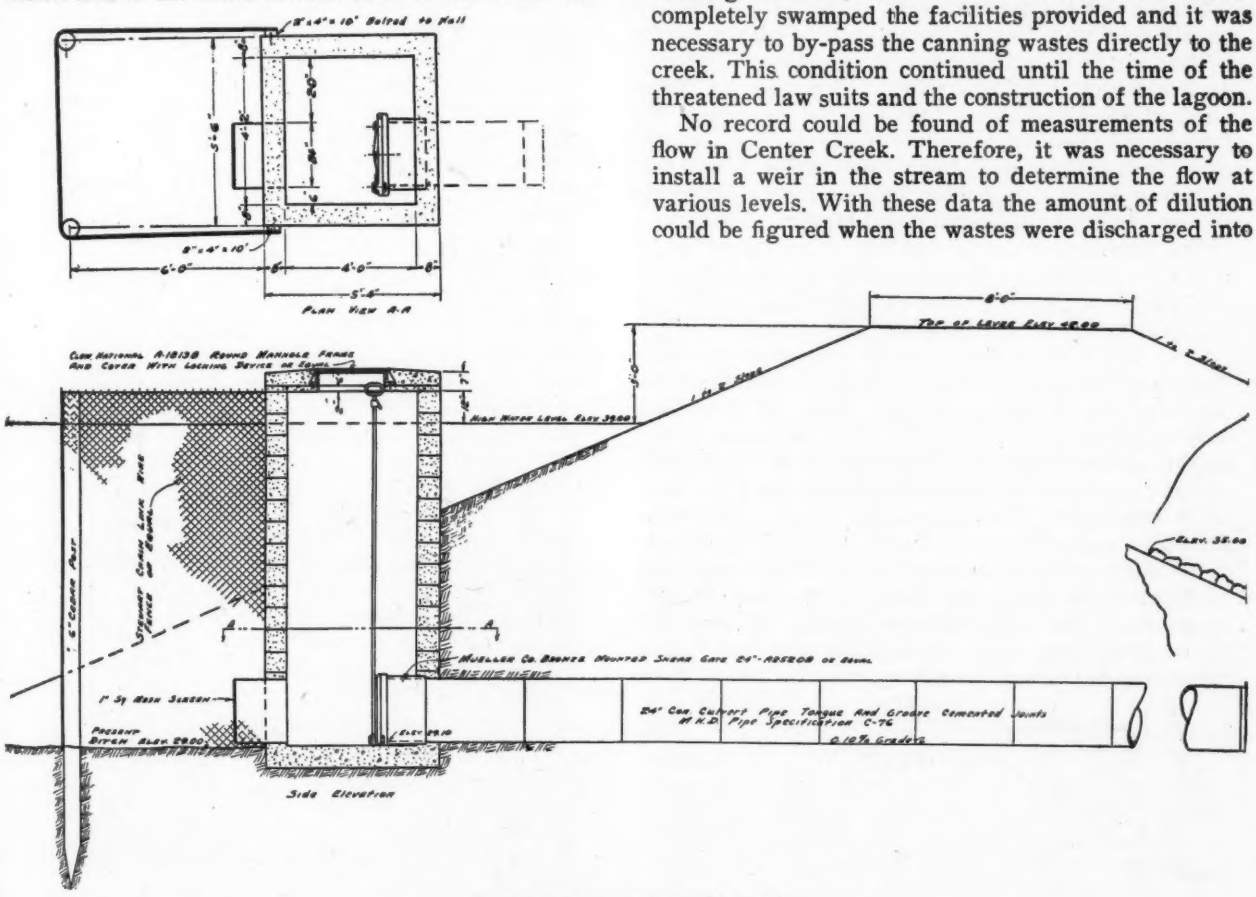
By **FRANK O. JONES, Fairmont, Minnesota**

Formed by low dikes around a slough, from which overflow into a creek is regulated to maintain desired dilution with varying stream flow.

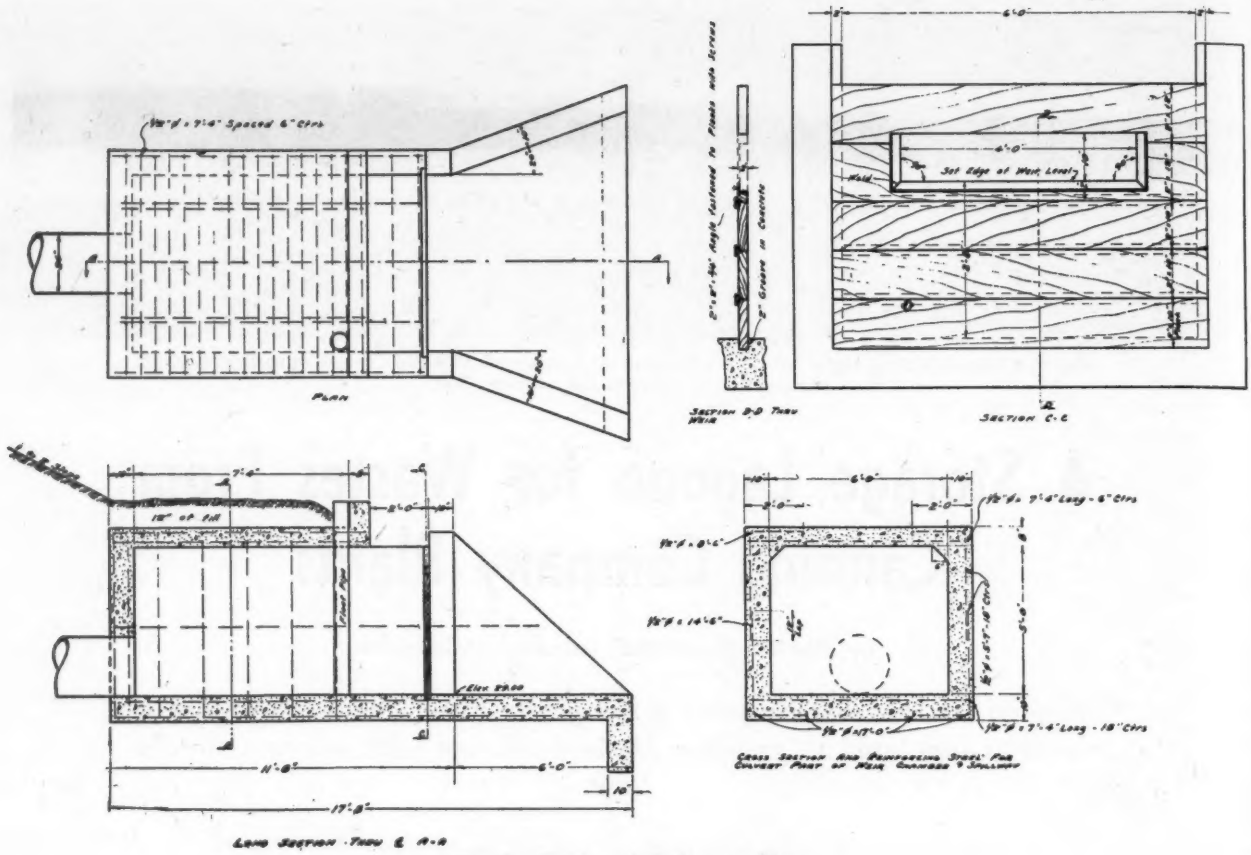
THE need for satisfactory disposal of wastes from our canning plants had been evident for some time, but threatened law suits from farmers whose lands were adjacent to Center Creek brought a definite decision on the part of the city council to take immediate action and in the latter months of 1941 the writer was ordered to prepare plans for an outfall sewer and storage lagoon to control the wastes.

The city had completed a modern sewage treatment plant for domestic sewage in 1932. Later a 12″ sewer line was laid to this plant to take the wastes from the canning factories, but it was found that such wastes completely swamped the facilities provided and it was necessary to by-pass the canning wastes directly to the creek. This condition continued until the time of the threatened law suits and the construction of the lagoon.

No record could be found of measurements of the flow in Center Creek. Therefore, it was necessary to install a weir in the stream to determine the flow at various levels. With these data the amount of dilution could be figured when the wastes were discharged into


Plan View A-A
Side Elevation
Top of Levee Elev. 4200
High Water Level Elev. 3900
Elev. 38.00
24" Con. Culvert Pipe Tongue And Groove Cemented Joints

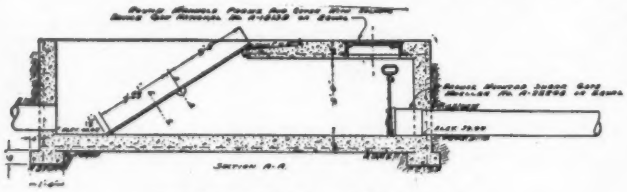
Discharge line and manhole detail.



Details of weir and discharge spillway.

the stream at definite rates. Fortunately, soon after building a temporary dam of earth and planks with a rectangular sharp-edged weir in the crest, variations of the flow in the creek occurred which gave us the desired range from a mere trickle to bank-full capacity. It was found that, in a range of readings of water levels from 0.40 foot to 1.90 feet on the gauge, the discharge varied from 29 cfs to 104 cfs. At the same time that readings were being taken at the weir, readings were taken on a similar gauge a short distance up stream at the site of the proposed lagoon.

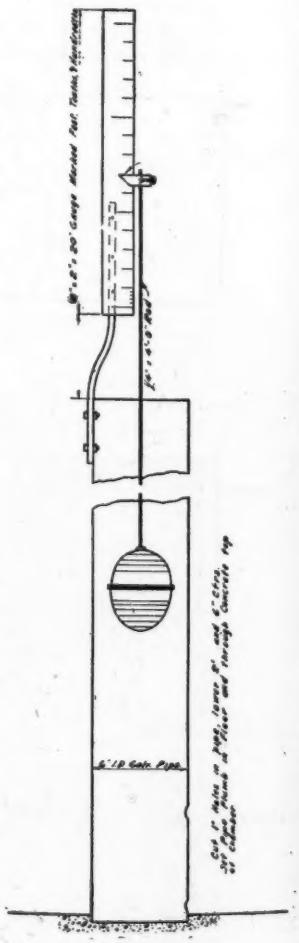
The location of the lagoon had been anticipated a year or so before the time actual construction started. The Fairmont Canning Company had purchased a farm situated on Center Creek, a half mile northeast of the city, on which was a slough which was subject to overflow from the creek at times of high water. The location was also favorable in the matter of prevailing winds. In the summer months when stored-up wastes might become stagnant and odorous, the prevailing south or southwest winds would tend to carry the odors away from town. This slough also served as an outlet for a drainage district of several hundred acres lying to the south, so it was necessary to provide a water-way around the east side of the slough to the creek to serve as an outlet for this drainage system. To form the lagoon it was only necessary to throw up a dike around the area of the slough needed and provide for the natural drainage of the surrounding lands in open ditches outside the dike.



Diversion manhole and bar screen.

How large an area to enclose in the dike and the volume of the lagoon that would impound the wastes for one canning season was a problem to be solved. Studies of similar canning wastes disposal projects had shown that it was necessary to hold an entire season's flow until the action of air and sun, and freezing during the winter months, could reduce the five-day B.O.D. from around 3,000 ppm to a point that would be safe to discharge into the stream during the spring floods, before the start of the next season. No records of the amount of wastes had been made during the past years of operation. The yearly pack was of course available, also approximate figures from other plants as to the amount of water used in processing a case of No. 2 cans of various kinds of vegetables. Peas

(Continued on page 46)



Float pipe and gauge.

Insufficient Backwashing Facilities Necessitate Remodeling Ten Filters

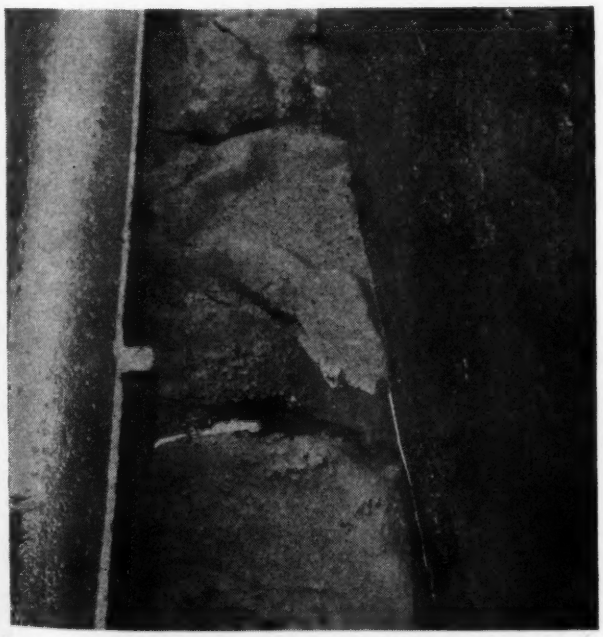
Baxter F. Wade

By BAXTER F. WADE
Superintendent of Water Dept., Jackson, Miss.

Air washing discontinued, new strainers installed, larger troughs set at a higher elevation, and washwater taken from the high-pressure pumps, were the remedies adopted.

JACKSON, Mississippi, with a 1940 population of 62,000, was growing quite rapidly by the time war was declared in 1941, and today it has an estimated population of 83,000. The increase in war-related projects, especially the development of the Jackson Army Air Base, brought additional loads on the water system, and the consumption records for the summer of 1941 portended plenty of trouble for the summer to come, 1942.

The records showed an average daily pumpage in excess of the rated plant capacity, 10 million gallons per day, and it was evident that something would have to be done during the winter and spring months in order to supply the expected demand in the summer of 1942. Preliminary plans for an extension to the existing plant were formulated by Black & Veatch as consulting engineers, and were studied by the water works superintendent and the city commissioners. Final decision on the extension plans was not made until March 1942, at which time application was made to the Federal Works Agency for priority and financial assistance in constructing the project. Further delays were in prospect before actual work could begin, with summer rapidly approaching, and a temporary expedient (which later proved to be a permanent improvement) was decided on. This was to remodel the filters so that they could pass more water, and change the backwashing methods so as to secure longer filter runs with a corresponding reduction in amount of washwater used, hence more net water produced by the plant.



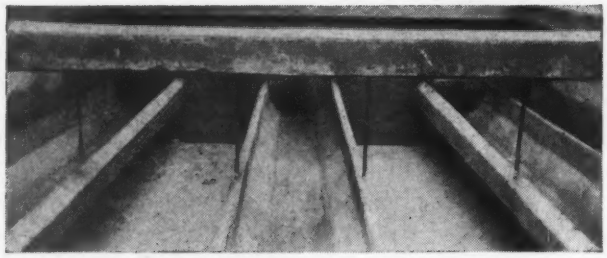
Typical condition of filters in March, 1942. Note cast-iron trough and rough side wall above muddy sand surface.

The water source is Pearl river, a flashy stream, though lazy in warm, dry weather. The treatment consists of coagulation with alum and lime, sedimentation, filtration, chlorination and ammoniation. The original plant, built in 1914, consisted of four 1-mgd filters constructed on top of a 600,000-gallon clear-water reservoir. The 15′ x 24′ filters were equipped with 2″ cast-iron lateral underdrains containing ⅜″ bronze perforated strainers, 1/16″ perforation, on 6″ centers, connecting into an eliptical 10″ x 8″ manifold. The manifold was connected by 6″ air pipes to an air blower capable of producing 1250 cu. ft. of air per minute. Air tubes were attached to the strainers which extended to within ¼″ of the lateral invert. A 3/32″ air hole at the top of each tube permitted air to escape into the filters and maintain a water seal throughout the underdrainage system. A 2,000 g.p.m. wash-water pump was provided with suction in the clear well and a 12″ discharge line to the filter underdrains.

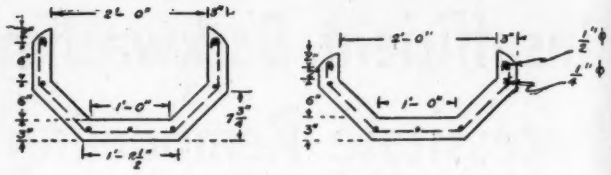
The filter medium consisted of the usual graded layers of gravel and 30″ of filter sand, effective size 0.42. The four wash-water troughs in each filter were cast iron, discharging through a header wall into a 12″ sewer outlet, which increased to 14″ in the pipe gallery.

Additional filters were added as the city grew, until by 1939 there were ten 1-mgd filters constructed almost identical to the original four, using the same pipe sizes, the same type of underdrains, and the same method of backwashing, i.e., combination air and water. Air was blown into the filter for 3 to 5 minutes, and quite some agitation and scrubbing was obtained thereby. Then the backwash water was applied at pump capacity, which was approximately 6 gallons per sq. ft. per min., creating a rise of approximately 10″. Quite often washwater was applied as long as 45 minutes before the waste was clear enough to justify restoring the filter to operation.

The results of this type of backwashing are quite clearly shown in the accompanying photograph. With such a small flow of backwash, there was practically no sand expansion and velocities were not great enough to bring mud particles to the trough overflow; hence the sand beds quickly became mud beds. The daily washing operation opened the beds sufficiently to permit water to pass for another 20 to 30 hours, but the



Concrete washwater troughs in remodeled filter.



Sections at ends of trough.

beds were never adequately cleaned by this method.

The first step toward rehabilitation was to get a washwater pump capable of producing a 24″ rise in the filter bed. A 12″ Worthington centrifugal pump of 5,600 g.p.m. capacity was placed on order, which later had to be cancelled due to WPB restrictions. Then the first filter was stripped of troughs, air pipes, sand, gravel and strainers. Practically half the strainer openings were found clogged, and a good many of the air tubes were imbedded in corrosion at the bottom of the laterals, rendering them unserviceable. The water at this point is very corrosive, having a pH of 5.6 to 5.9 and containing 10 to 12 ppm of CO_2, which explains the corrosion and tuberculation in the cast-iron lateral.

Most of this accumulation was cleaned out with the laterals in place by flushing with high-pressure hose, using a nozzle small enough to enter the openings in the laterals. The perforated bronze strainers were discarded and new bronze umbrella type strainers, supplied by E. W. Bacharach Co., were installed. No air tubes were used on these strainers because it had been decided to abandon the use of air in the backwashing process.

The decision to use a higher-velocity backwash brought on further complications. The lips of the four cast-iron troughs had been placed only 12″ above the sand surface and had been designed to carry only about half the actual amount of water needed. It became necessary, then, to design and construct new washwater troughs of sufficient capacity and at an elevation which would permit adequate rise without the loss of sand. Three concrete troughs, as shown in the illustrations, were built at an elevation to give a freeboard of 24″. The influent baffle wall was raised correspondingly to cut down disturbances created when water was turned onto the filter.

The concrete walls of the filter box were very rough and were sand blasted and a coat of grout put on with a cement gun, then troweled down to the sand line. This gave a smooth, clean looking surface, not too conducive to accumulating a coat of floc and algae.

Most of the old gravel was cleaned, regraded, and replaced in the filters, and two layers of new gravel were used, one a 2″ to 2½″ stone on the bottom, and the other, ⅛″ gravel on top to support the sand. The five layers of gravel were placed thus:

2″ depth of ⅛″ — ¼″
2″ depth of ⅜″ — ¾″
3″ depth of ¾″ — 1″
3″ depth of 1″ —1½″
6″ depth of 2″ —2½″

Attempts were made to clean some of the old sand, with little success. As the cost of cleaning would approximate the cost of new sand, a 30″ layer of clean, new sand, effective size 0.42, uniformity coefficient 1.65, as produced by Dawes Silica Company, Thomasville, Georgia, was used.

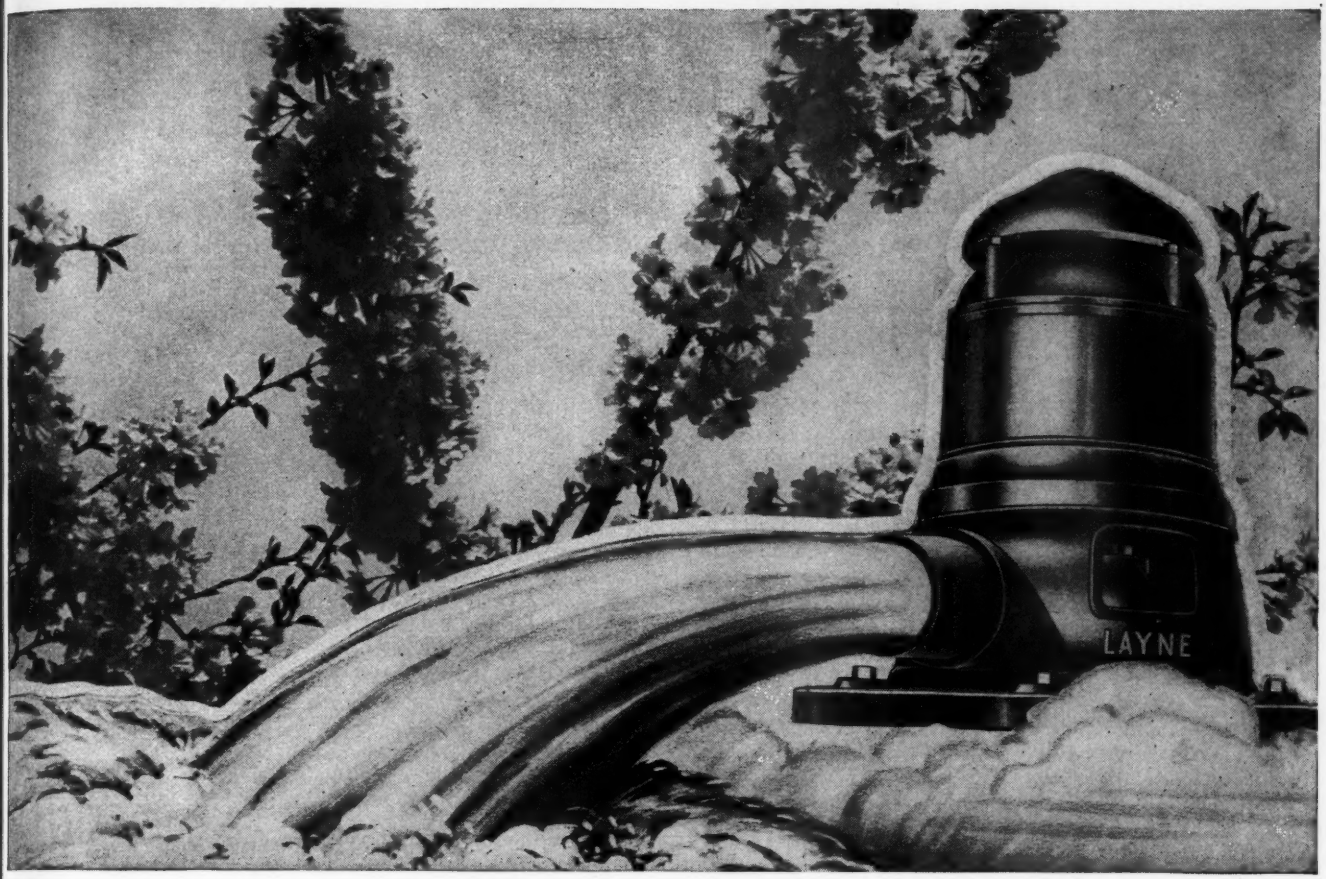
This same procedure was followed on one filter after the other, until by June, five of the ten filters had been overhauled. But there still was no prospect of obtaining a wash-water pump to adequately wash them, and the filters first overhauled were becoming clogged, with the lengths of runs ever on the decline. To prevent a recurrence of the condition which had just been eliminated, a 12″ line from the high-pressure city pumps was tied to the 12″ washwater line in the gallery and a hand-operated valve on the main line was used to throttle the pressure and control the amount of water admitted to the underdrains. This proved to be a rather cumbersome operation, but served the purpose sufficiently well until other arrangements could be made.

Another bottle-neck, which had been suspected after some calculations, quickly developed. The 14″ main waste-water sewer would not carry off water equivalent to a 24″ rise. The extremely small pipe gallery would not permit enlarging it without tearing out practically everything in it—an impossibility, since the plant had to operate continuously. The problem was partially solved by opening the upper end of the sewer and extending it outside the building to a free discharge in a manhole. With both ends of the sewer thus open, it was possible to carry off as much as 6400 g.p.m. in six of the filters, but only 4600 g.p.m. in the other four, the difference apparently being due to increased friction losses in the piping arrangement of the upper four filters. When washing filters, the operators throttle the 12″ valve on the washwater line at just the capacity point of the sewer outlet.

Overhauling continued through the summer of 1942 and the last of the ten units was completed in September. The "new" filters did a creditable job of producing water during the peak months, although the demand proved not as high as in 1941. Individual filter runs up to 125 hours and washwater as low as 1% were obtainable with no apparent adverse effects.

All obstacles and restrictions on the plant extensions were not overcome until May 1943, when actual construction started; and incidentally is still underway at this time. It is expected that the new units will be in operation by March 1944. Further revisions and improvements to the filter pipe gallery will necessarily be delayed until after the war. However, a second-hand steel washwater tank was included in the present construction and will solve part of the washing problem.

The water works is owned and operated by the City of Jackson, Walter A. Scott, Mayor, R. M. Taylor, and A. F. Hawkins, Commissioners. These three men have been in office continuously since 1916, with Water Commissioner Taylor in office since 1912. J. H. Fewell, former Superintendent of Water Works, passed away January 28, 1943 and was succeeded by Baxter F. Wade, February 2, 1943. The work outlined in this article was done under the latter's supervision while he was Assistant Superintendent.



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WELL WATER SYSTEMS

DEEP WELL PUMPS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

A Biorobic Gremlin at the Sewage Plant

What It Did to the Author (Who Wishes To Remain Anonymous) And What He Did to It. Encouragement to Discouraged and Suggestions to Perplexed Operators

A FEW years ago we installed one of these modern sewage treatment plants—modern and temperamental. It was so modern at that time that it was the first life-sized two stage rapid recirculation biorobic filter plant ever constructed. Our courage (or rashness) has since been completely justified by operating results, but for a while we were all a bit jittery.

The slowness of the "seeding in" period was particularly trying, as we had sanitary, construction, consulting and operating engineers with an admixture of salesmen and health officials on one hand, and an impatient and doubting City Council on the other hand, with us unfortunate city employees squirming between them on all the squeeze plays.

Then at long last things settled down somewhat and it really began to look as if the expensive installation might do some of the work it was supposed to do. For nearly a week nothing broke down, nothing leaked, no motors got hot, and we did not shut down for adjustments. But alas, well do I remember the dark day when the plant operator reported excitedly that his patient had suffered a relapse and had a terrible case of indigestion. The settling tanks were a light red color, teeming with millions of giant maggots; the odors were such as to make throats raw and eyes watery; and great clouds of flies were gleefully assembling. Filters were stopped up and ponding, the digester foaming like a volcano, and the supposedly over-sized pipes were clogging with sludge.

I feverishly by-passed the plant, telephoned an SOS to our sewage consultant, and then started on a hunt for the perpetrator of this dirty deed. When I got about half a mile away from the plant the heavy atmosphere was sufficiently diluted to take a normal breath, and then I discerned that the predominant component of the polluted air was undoubtedly alcoholic. With this as one clue and the revolting residua of prize winning maggots as another lead, I backtracked the course of flow by sniffing at and peering into manholes until I located the source of the upheaval in a combined winery and distillery.

None of these industries is allowed to run its wastes into the sanitary sewer system, but this place had a smart manager who was cleaning up for autumn business. To be sure, they had no industrial sewer connection, but he used his head and was running a line of wine hoses into the ladies' toilet. When I walked in he was just completing the draining of two tanks of spoiled stock—1000 gallons of prune brandy and 10,000 gallons of sour wine.

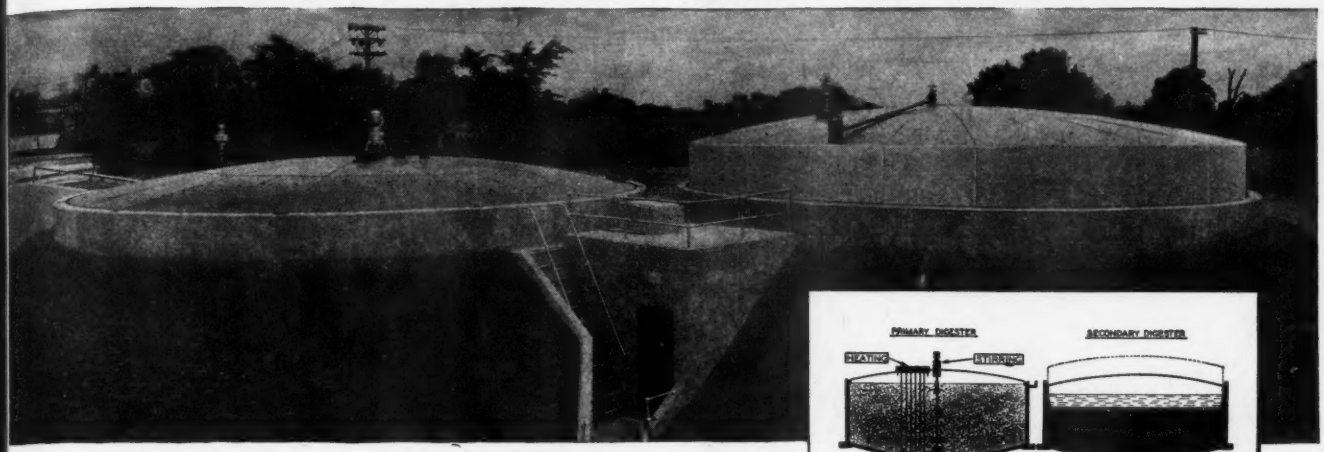
No wonder we were having trouble. This disastrous charge was not only equivalent to overloading the plant of twenty times its capacity, but the alcohol seemed to have a curdling effect on the ordinary domestic sewage—expanding the sludge to ten times its normal volume. Hence the violet odors, the pretty colors and the underdrain stoppages.

The sanitary expert arrived that night, and it was some help to hear him express in King's English what had been seething through my tense lips in workman's lingo. He did a fair job of it, too. Then it was decided to flush out the plant and start afresh. This in itself presented difficulties, because the return from the primary filter to the recirculation sump was plugged solidly. We could not work in the pump sump in its present condition, and to get at the other end of the line would require the laborious removal of tons and tons of flooded filter rock.

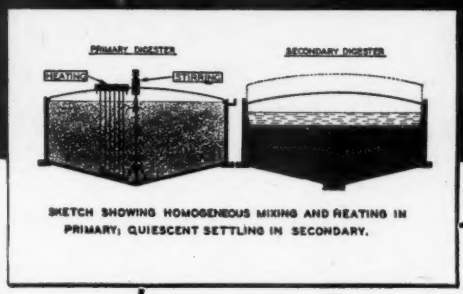
So in a desperate attempt to break something loose I flooded the filter as high as possible, blocked the sump float switch to keep the pump running, and prayed that the difference in head would force the plug from the pipe line. We lowered a light into the pump sump, and the operator, the expert and poor trembling me peered anxiously at the end of the blocked pipe. Then all at once I believed I was seeing things that just could not happen. The eighteen-inch iron pipe, firmly anchored though it was in solid concrete, appeared to be shoving itself through the wall. That was impossible, and yet there it was, corrugations plainly showing, crawling across the bottom of the pit. Partly supported by a few inches of liquid remaining in the sump, the black, colloidal, plastic core in the pipe was slipping out. It maintained its cylindrical shape, even as it got cramped and coiled inward toward the center of the pit, and the corrugations gave it the realistic appearance of some monstrous articulated worm. As the spiral closed in at the center, it seemed to raise its ugly head, and then the illusion was spoiled as lack of space caused the coils to slump and coalesce. I was fascinated by the sight, and jubilant as I realized that we had forced the beast to crawl from his lair, and now we could start cleaning house. I turned to congratulate the consulting sanitary engineer, but he was not with us. I found him outside, feeding his late dinner to some of the giant maggots, while they threw filter rock at him! My operator decided that *we* were the specialists who could "take it."

Since then we have had a few troubles, but none commensurate with those of the first few hectic weeks. Some industrial wastes, like the sticky, starchy effluent from our dehydrated potato "hatchery" we absolutely refuse to handle; but other less settleable vegetable and fruit processing wastes we can help out on by real cooperation with these plants. Usually they put in local storage facilities which we dump when we can by-pass the plant at periods of off-peak loading. Extra chlorination and separate effluent beds at our plant have almost solved the problem with a little extra watchfulness and labor. The dried sludge, thank goodness, is fought over by local farmers, and this competition keeps our special and regular sludge drying beds in excellent condition.

ADEQUATE MIXING IS THE ANSWER TO SLUDGE DIGESTION PROBLEMS



● Hagerstown, Md. — A typical Dorr Multdigestion System. Stirred and heated primary tank at left; unheated, plain secondary at right.



SKETCH SHOWING HOMOGENEOUS MIXING AND HEATING IN PRIMARY; QUIESCENT SETTLING IN SECONDARY.

DORR MULTDIGESTION SYSTEMS PROVIDE AUTOMATIC CONTROLLED DIGESTION BECAUSE:

1 **Continuous primary mixing** accelerates seeding and greatly simplifies the piping system.

2 **Efficient vertical heat exchangers,** instead of "around the wall" type, distribute heat uniformly, which eliminates cold zones. Heaters can be withdrawn during operation for scale removal.

3 **Supernatant is withdrawn automatically** from the quiescent secondary. It is comparatively low in B.O.D. and solids and in most cases is returned to process without disturbing operation.

4 **The piping required** for the operation of Multdigestion is simple in its arrangement.

5 **Scum is seldom a problem** because of adequate mixing and heating. Special chemical treatment is unnecessary.

ADVANTAGES OF DORR MULTDIGESTION

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- Average gas production 15 to 20 cu. ft. per pound volatile destroyed—⅓ or more greater than in non-stirred primaries.
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- Maximum digestion capacity per cu. ft. of tankage.

Quiescent Sludge Settling in Secondary Means

- A supernatant liquor usually suitable for return to process.
- A dense, compact sludge for drying, filtration or incineration.
- A combination cover and gas holder that provides ample gas storage.

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When to Paint Traffic Lines

Conclusions from Tests as to Favorable and Unfavorable Moisture and Temperature Conditions

THINKING it probable that the season of the year when traffic lines are painted on a road and climatic conditions during the early days of exposure have a direct bearing on the life of a traffic paint, The New Jersey Zinc Co. applied several paints to a road during each of the months from February to June, both inclusive, and observed the differences in durability. Their findings are given below.

1. Weather conditions during the application, drying, and exposure periods definitely affect the durability of a traffic paint.

2. Excessive moisture during the first months of exposure of traffic paint lines is generally detrimental to their durability.

3. Saturation of the fresh film with water accompanied by freezing temperatures tends to promote film failure. Impact of tire chains undoubtedly accelerates the rate of failure.

4. Exposure of the freshly dried film to cold not accompanied by moisture is not detrimental to the durability of most traffic paints, even though the aged film is subjected to water and cold.

5. While a high grade traffic paint may provide reasonably good service under adverse weather conditions, a poor paint will not provide good service even under the most favorable climatic conditions.

The results indicate that the highest types of paint may have poor durability if the weather conditions are unfavorable during the exposure period. The durability of the February applications of practically all the paints was poor. The temperature was below freezing during this application and for the next two days, when a rise in temperature was accompanied by a heavy rain followed by freezing temperature. It was below freezing an appreciable part of the time, accompanied by considerable snow and rain during the first two or three months of exposure. Such conditions place a severe strain on a paint film and, considering that an appreciable part of this time the film was subjected to the abrasive effect of tire chains, the general chipping and rapid wear of the traffic lines would be anticipated. It is interesting that in a few cases the paint provided fair service under these severe conditions.

While it was cold during, and for several days directly following, the March and April applications (approximately freezing for the March and slightly above for the April) there was no precipitation, and there was only one very short period (April 9 and 10), during these two entire exposures, when there was sufficient snow on the road to necessitate the use of tire chains. The fact that in practically all cases the applications made on these dates provided good service indicates that cold alone is not necessarily detrimental to the durability of a traffic paint film. The poorer service provided by the February applications must, therefore, be attributed to the severe soaking of the fresh paint films followed by freezing and/or the impact of tire chains.

In general, the May application provided poor service, averaging better only than the February applications. The poor durability of this series may also be attributed to the weather conditions during the early exposure period. It was a very rainy season. The absorbed water content of the films was high, reaching the saturation point for periods extending over several days. The lower abrasion resistance of wet paint films undoubtedly accounts for the poor durability of this series.

The June application is representative of the maximum gallonage of traffic paint actually applied to highways. This series averaged slightly poorer than the March or April exposures, but better than either the May or February applications. The climatic data indicate that the weather was normal. The poorer durability of this series compared to the March or April applications must be, therefore, attributed to the greater amount of traffic the lines received (winter versus summer driving).

Newton, Massachusetts, Bridges and Curbs

Newton, Mass., a suburb of Boston with a population of about 70,000 on an area of about 18 square miles, contains 48 bridges, 5 overpasses and 4 pedestrian tunnels. This seems like a lot of bridges for one city—an average of one for each four miles of streets. Of these, 31 are highway bridges over railroads; 10 are highway bridges over streams; 7 are footbridges, 3 over railroads, 3 over Charles river, and one over a highway. Also there are 5 overpasses at highway junctions and 4 pedestrian tunnels under railroads.

Grade crossing elimination is responsible for the bridges over railroads. The main 4-track line of the B. & A. R. R. runs for 4.77 miles through the northern part of the city and a double-track branch runs for 6.16 miles through the southern part. A program of grade crossing elimination was started in 1896, under which most of these miles of tracks were depressed, and bridges placed at all street crossings. These bridges belong to and are maintained by the railroad, except that the city maintains the asphalt pavements on roadways and sidewalks of all but 5 of them, 4 being maintained by the railroad, one by the Massachusetts Dept. of Public Works and one by the Metropolitan District Commission. Of the bridges over the river, two are maintained by the Mass. Dept. of Public Works, while the city maintains that portion of each of the others which is within Newton's city limits.

Curved and Straight Curbs

The annual report for 1942 showed that there had been constructed that year 2,180 linear feet of curved curb out of a total of 13,113 ft. of curb—about 16%. This would seem to indicate that the average length of block was little if any more than 100 ft., which was improbable. The answer we found to be as follows:

The city ordinance requires that, when a street is accepted by the city, curved curbing be installed at all corners, with 5 ft. of tangent curb at each end; but it is optional with the abutting property owner whether curb be built between the corners. If straight curb is built on the abutting owner's petition, he pays half the cost. Some streets therefore have curved curb at the corners but none between them.

The city standard radius for corner curbs is 23 ft., giving 18.75 ft. of curved curb at a 90° corner, or 28.75 ft. including the 5 ft. tangents. The 1942 figures therefore indicate that curved curbs were built at 116 corners, and an average of 84 ft. of straight curb (plus the two 5 ft. tangents) per block between corners. In other words, probably two-thirds to three-fourths of the property on streets accepted that year did not put in any straight curb.

. . . Out of Reach . Out of Luck . . .

GOOD roads are as beneficial to the farmer in a business sense as they are to the motorist in a pleasure sense. Almost any rural [illegible]munity that will plan ahead can [illegible] the right T[illegible]ia roads as [illegible] [illegible]ements.

TIMES HAVE CHANGED BUT NOT THE STORY

In 1930, Barrett published this advertisement championing the cause of the farmer. Yet, despite fourteen years of unprecedented road-building activity, Pearl Harbor found this country with 1,474,445 miles of roads still unsurfaced. This means that in the present crucial war period thousands of people are being denied quick and easy access to major traffic routes.

Actually, all over the country, the plight of the farmer "out of reach and out of luck" is more difficult than ever before. Today, under the stress of accelerated use and unavoidable wartime neglect, even the surfaced "feeder" roads are wearing out and breaking down.

In fact, the problem of secondary roads is one which far-seeing highway officials realize must be dealt with *first* in post-war planning.

Barrett Tarvia is a prime factor in these plans. This famous basic road-building and maintenance material has already proved its practical value to tax-conscious communities in making possible economical construction by local labor — using local materials. The Tarvia field man will gladly give you full details, help you with the development of your post-war program.

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Cement Painting of Asphalt Reservoir Lining

Damaging Effects of Silt and Vegetable Film That Accumulates on the Lining, Prevented by Spraying On It a Thin Coat of Cement, Containing Calcium Chloride to Prolong its Drying.

ELYSIAN reservoir, a storage basin of the water supply system of Los Angeles, Calif., which has been in service since 1903, has been enlarged from a capacity of 32 acre-feet to 160 by constructing a new earth dam 350 ft. down stream from the original one. The old dam was removed and the material, approximately 17,000 cu. yd. of sandy clay, used for a blanket 3 ft. thick on the slopes and bottom of the reservoir. The blankets on the slopes were trimmed by use of a tractor-operated bottomless scraper and a winch at the top of the slope, and hand finished. The 322,000 sq. ft. of the slopes and bottom were then paved with a 3″ layer of asphaltic concrete, using 50-60 grade paving asphalt and an aggregate with maximum size of 1″. This pavement was compacted on the slopes by use of a hot roller weighing approximately 400 lb. per lin. ft., followed by a cold roller 3 ft. wide weighing 2,000 lb. per lin. ft.

This method of lining has been used by the Los Angeles Dept. of Water and Power for several reservoirs. A problem that has arisen in connection with these linings, and the solution of it, has been described by H. A. Van Norman, Chief Engineer and General Manager of the department, in "Calcium Chloride Association News," to which we are indebted for permission to reprint it. Mr. Van Norman's article is as follows.

For protection of the earth embankment lining of small reservoirs where severe wave action will not be encountered, we recently have used a 3-inch paving of asphaltic concrete or pre-mixed asphaltic paving similar to that used in highway work.

It was found that there accumulates on the surface of the paving under water a film of fine material, silt, decayed vegetation, etc., which, when drying because of the lowering of the water level in the reservoir, causes considerable disintegration at the surface of the asphaltic material. This occurs as severe shrinkage and peeling of the surface of the asphalt material. It appeared that a means of preventing this would be the application of a cement paint coating to the paving surface.

As we had used a mixture of calcium chloride and neat cement for paint coatings previously where it is impossible to otherwise hold enough moisture in the paint coating to insure setting of the cement, it was decided to try this mixture again.

Experimental sections were placed on one of our reservoir linings. These have been under test for two years and appear to be standing perfectly. One small reservoir was so protected with a brushed-on coating which now appears to have been too thick, some failure apparently being due to expansion of the too-thick coating under water.

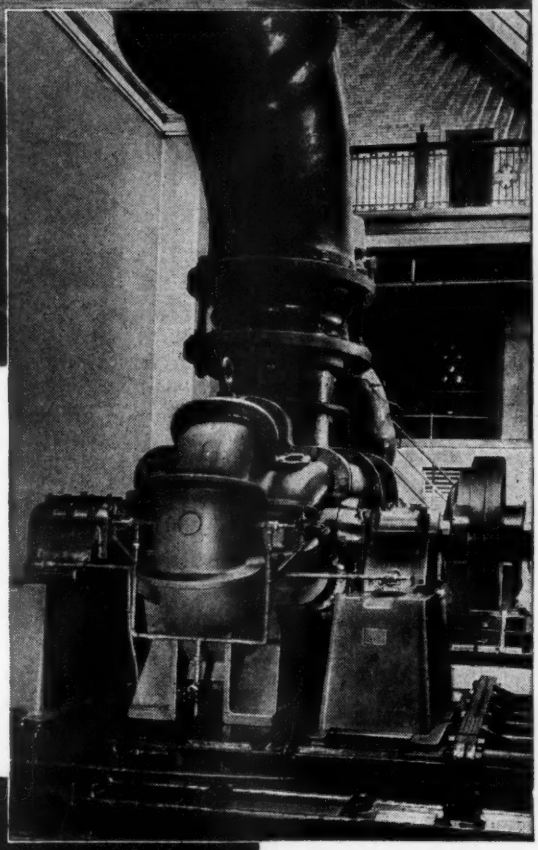
Experiments were undertaken in connection with the Elysian reservoir to determine if this mixture of cement and calcium chloride can be sprayed successfully by putting on just enough thickness of coating to insure breaking the bond between the accumulated film and the paving.

The result of these experiments indicated that for a sprayed coating, using about one sack of cement for 600 sq. ft. of paving, 7½ lb. of flake calcium chloride per sack of cement would be sufficient. This determination was made by applying a thin film of muddy clay to the pavement and to the pavement protected by the cement coating. The clay, upon drying and shrinking, produced large cracks in the unprotected pavement, but that protected with the cement coating showed only very few spots where damage was done.

The application of this coating had to be done during the hottest and driest portion of the year and could

This photo shows construction operations in the basin of the new Elysian Reservoir. The outlet tower is in the center. Majority of the grading has been finished and bank paving is proceeding.

Fairbanks-Morse Centrifugals Pump 160,000,000 Gallons a Day for CHICAGO!



CHICAGO'S water supply problem—the plea for greater diversion of Lake Michigan's water—is one of the most publicized stories in the nation.

But equally important, though not so well-known, is the story of Chicago's well-administered and well-equipped municipal water system with its four large intakes and pumping stations on the city's twenty-five mile water front.

One of these—the Thomas Jefferson station—is equipped with four, thirty-inch Fairbanks-Morse Centrifugal Pumps that take in and drive out into the city's mains—one hundred and sixty million gallons of water a day! It is Chicago's first all-motor-driven pumping station acclaimed by engineers as the *finest*, for efficiency and design.

★

Fairbanks-Morse builds efficient pumping equipment for all sizes of municipalities—from the largest to the smallest.

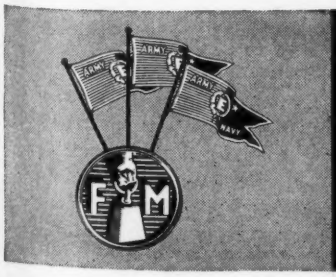
If your municipality has pumping problems now, or if you are planning for the future—why not consult with Fairbanks-Morse Pump Engineers. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

★

Thirty-inch Fairbanks-Morse Centrifugal Pumps drive water into Chicago mains at 27,800 gallons per minute against a total dynamic head of 152 feet, including a 6-foot suction lift.

★

View of elbows and discharge pipes that help visualize the size of a 160,000,000 gallon pumping operation.



FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

F M Pumps

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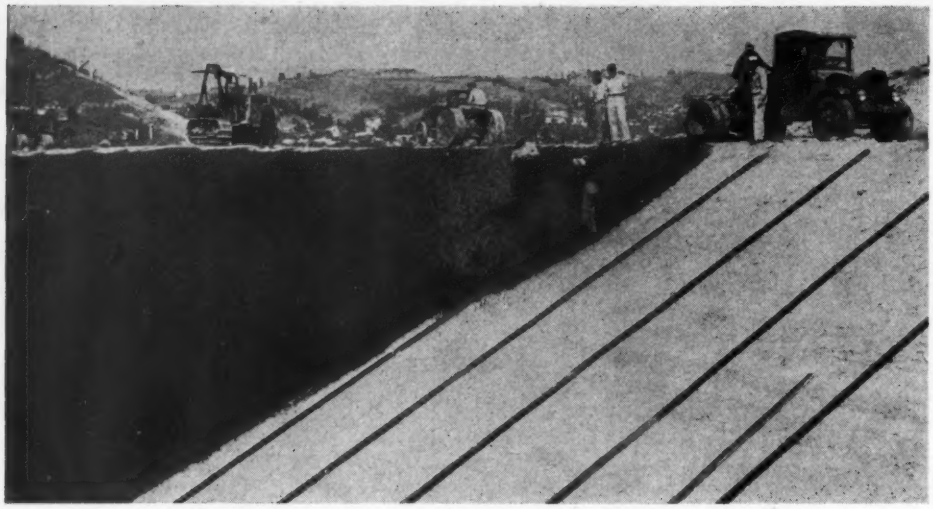


Side slopes were paved with a 3-in. layer of asphaltic concrete, using maximum aggregate size of 1 in. The finished paving was sprayed with neat Portland cement mixed with 8 per cent by weight of calcium chloride.

hardly have been undertaken except with the use of calcium chloride to hold moisture in the coating while it was setting, as a thin film of this type would dry within a half-hour if this were not done.

The method of application was to mix the cement and water, 6 gal. of water per sack of cement. The mixture was then pumped into a pressure chamber equipped with a mechanical agitator and the calcium chloride added in a solution of 8 lb. of calcium chloride to 1 gal. of water, as the agitator was operating. It was found that this strong solution did not cause any hardening of the mixture when applied in this manner.

Air pressure, 70 lb. per sq. in., was used to force the mixed material from the agitator to the spray nozzle. A large paint-spray nozzle having a 3/16 in. tube was used for the spraying.

It was found that too thick a layer would result in shrinkage and cracking within a few hours. If additional thickness is found to be necessary it is our intention to apply another similar coat. However, after two months of exposure it appears that this coating will be very satisfactory.

The amount of calcium chloride used and the thickness of coating which can be secured appeared to be determined by air temperature and humidity. It is probable that some experimental work would need to be done at any other location in order to determine the thickness of coating and calcium chloride content for the particular field conditions.

New A.S.A. Standards for the Public Works Field

The American Standards Association, a federation of 77 national organizations, has approved since April 1, 1943, a number of new and revised standards, which can be obtained from the Association at its office 29 West 39th St., New York 18, N. Y. In each case, the standards approved by the ASA represent general agreement on the part of maker, seller, and user groups as to the best current industrial practice. More than 600 organizations are taking part in this work.

These new and revised standards are as follows:

Highways:

Determination of Bitumen, Method of Test for (ASTM D4-42).

Amount of Material Finer than No. 200 Sieve in Aggregates, Method of Test for (ASTM C117-37).

Specific Gravity and Absorption of Coarse Aggregate, Method of Test for (ASTM C127-42).

Specific Gravity and Absorption of Fine Aggregate, Method of Test for (ASTM C128-42).

Abrasion of Coarse Aggregate by Use of the Los Angeles Machine, Method of Test for (ASTM C131-39).

Sieve Analysis of Fine and Coarse Aggregates, Method of Test for (ASTM C136-39).

Distillation of Tar Products, Suitable for Road Treatment, Method of Test for (ASTM D20-30).

Softening Point of Bituminous Materials, Ring-and-Ball Method, Method of Test for (ASTM D36-26).

Ductility of Bituminous Material, Method of Test for (ASTM D113-39).

Proportion of Bitumen Soluble in Carbon Tetrachloride, Method of Test for (ASTM D165-42).

Residue of Specified Penetration, Method of Test for (ASTM D243-36).

Sieve Analysis of Mineral Filler, Method of Test for (ASTM D546-41).

Pre-Timed, Fixed Cycle Traffic Signal Controllers, Specifications for.

Railroad Highway Grade Crossing Protection (AAR Bulletin 3).

These are sold at 25 cts. each, except the last, which is 10 cts.

Waterworks:

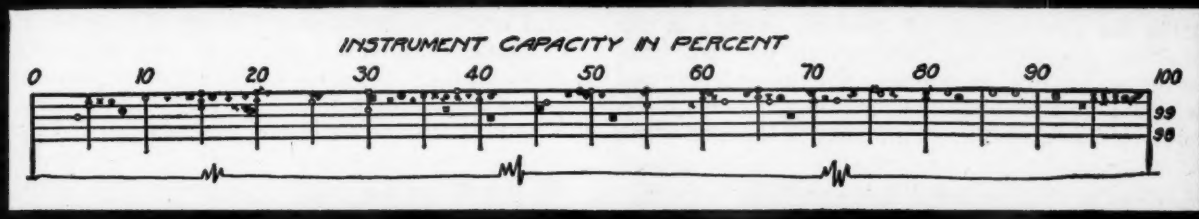
Pressure Ratings for Cast-Iron Pipe Flanges and Flanged Fittings, Class 125 (Revision of Paragraph 1, "Pressure Rating," and Paragraph 3, "Marking," on page 3 of American Standard B16a-1939, American War Standard). 10 cts.

Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses, Specifications for (ASTM A120-42). 25 cts.

City Refuses to Handle Wastes That Stall Sewage Plant

A municipality may refuse to accept for treatment at its sewage disposal plant industrial wastes which interfere with the successful operation of the plant, according to a decision handed down on September 27 by a state circuit court in Madison, Wisconsin. The facts in the case were: The city of Kenosha upon order by the state board of health built a sewage disposal plant which began operation in 1940. It was soon discovered that bacterial action in the treatment of the sewage was practically eliminated by the large amount of copper sulphate, grease, oil, and other substances contained in wastes deposited in the sewerage system by two concerns engaged in the manufacture of brass and copper products.

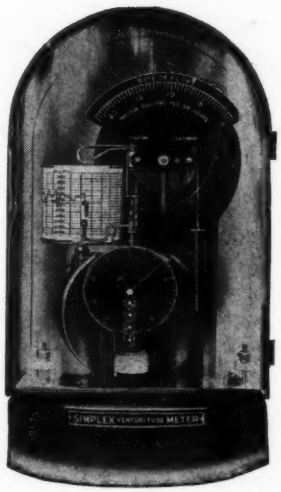
As a temporary expedient the city bypassed these industrial wastes and a large percentage of the raw sewage of the city into Lake Michigan without treatment. Within a short time the water and the city's beaches were covered with a greasy scum which led to many complaints. The city owns about 90 per cent of the lake frontage a large portion of which is being developed into parks and bathing beaches.



Here is visual proof of the efficiency of Simplex MO Meters taken from Weighed Water and Volumetric tests.

The OVERALL ACCURACY of the SIMPLEX MO METER

AS SHOWN BY WEIGHED WATER and VOLUMETRIC TESTS



The matter of final concern to the user of a flow rate meter is the overall efficiency of the instrument — whether its purpose is to indicate, record, or totalize the flow.

The efficiency of sixteen Simplex MO Meters when tested in place by weighing scales and checked by the volume of standpipes is here illustrated. The data was taken at random from routine records of wide-range tests conducted by the laboratory of Simplex Valve & Meter Co. These accuracies speak for themselves.

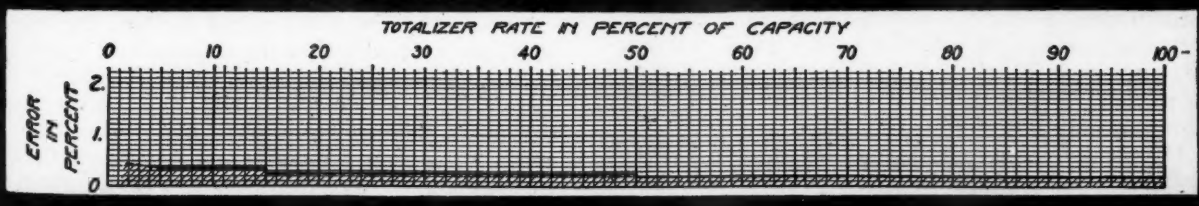
In addition to its inherent accuracy, the Simplex MO Meter operates on a simple trouble-free principle which assures extreme sensitivity over the entire meter range. An applied differential head of 1/8 inch of water or less is sufficient to cause functional operation of this instrument. Any change in the rate of flow through a primary device is instantaneously and accurately recorded on the Simplex Meter Chart.

In the unique totalizer design, a frictionless vertical movement of the assembly occurs with flow changes. Constant speed revolution of a friction disc through the variable horizontal speed of a traction roller integrates the rate of flow. The result is highly dependable, accurate totalization of flows over the entire range of the instrument.

Investigate the exceptional values of the Simplex MO Meter. Write today for Bulletin 300.

SIMPLEX VALVE & METER CO.
6750 UPLAND STREET, PHILA. 42, PA.

An error curve showing totalizer rate in percent of capacity against actual weighed water.



When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

City officials finally took up the matter with the state board of health which ordered the two companies to treat their waste materials in such a manner as to enable the city to treat all domestic sewage at the municipal disposal plant. The private companies demurred and the attorney general of the state affirmed the order of the state health board. The companies then took the case to the circuit court at Madison which has sustained the order of the state board and ordered the companies to eliminate the nuisance caused by contaminating and ruining the city's beaches and by discharging into the sewerage system industrial wastes that cannot be handled reasonably through the disposal plant. Late in October the companies took an appeal to the state supreme court.

Many other cities are faced with the same problem —waterfront nuisances created by disposal of industrial wastes containing grease and oils and nuisances causing serious difficulties in the operation of the sewage disposal plant. Some industries believe that a municipality is obligated to provide anything that is demanded; the industry may threaten to move out of town unless its request is granted. This court decision in Wisconsin should strengthen the position of cities in their determination to avoid providing special privileges. It is entirely possible for industrial concerns to prepare their wastes for proper handling by the sewage disposal plant.—JAMES G. WALLACE, city manager, Kenosha, Wisconsin, in *Public Management.*

Local Responsibility for Public Works

In recent years the practice of making federal grants to states, counties, cities and other units of government has extended to federal aid for projects of benefit and value to the local community only.

This practice tends to destroy the sense of responsibility of local public officials, encourages carelessness in public finance, and discourages efficiency in the execution of public construction projects. This is breaking down the American system of local self government.

The Associated General Contractors of America, Inc., in the 25th annual meeting in Chicago, Illinois, February 7-9, 1944, opposes the principle and practice of making federal grants to states, counties, cities or other governmental units for the construction of public improvements of local benefit only.

Resolution adopted by the A. G. C.

Michigan Appropriates Five Million to Local Governments for Planning*

Most significant recent development in state-local fiscal relationships is the action of the Michigan legislature in appropriating, at the special session called by Governor Kelly early in February before its adjournment February 18, five million dollars for distribution to local governments on a matching basis for the preparation of project plans and specifications for post-war construction.

The appropriations are made to cities, villages, counties and school districts, with the provision that funds in an equal amount shall be made available also by the governmental unit receiving them.

Of the total appropriation, three million is made available, on a population basis, for plans for public works projects, other than streets and roads.

One million is available to cities, villages and organized townships for planning street and road projects distributed on a population basis. For extremely small local units a minimum distribution of $200.00 is provided. One million is available to counties, also to be distributed by population, for planning rural road system construction.

Funds are to be made available at once, and remain available until November 1, 1944. After November 1, the amounts available to local units which have not made use of the funds will be redistributed among units which have availed themselves of the original allocation and choose to continue with the program.

*Reprinted from A.M.A. State League Notes.

Highway Base Stabilization in Great Britain

Stabilization of bases has been obtained successfully in Great Britain by each of four processes—mechanical, bituminous, soil-cement and waterproofing, according to A. H. D. Markwick, of the Road Research Laboratory of that country. The mechanical stabilization methods seem to be based largely on United States practice. In fact, most of the examples are access and camp roads constructed in England by U. S. engineers, using clay mixed with gravel or quarry waste.

Bituminous stabilization is confined entirely to sand-asphalt and sand-tar—chiefly the former. Mixing of cohesive soil with cut-back asphalt has not been tried there.

Two experimental roads of soil-cement were built in 1942 by the Road Research Laboratory, using pit gravel mixed with 10% and 12% respectively of cement. These bases were surfaced with a dense tar-gravel carpet. Both are still in excellent condition. Other areas were built by U. S. Engineers using sandy loam, or clay, or gravel. A test section using a mixture of asphalt emulsion, portland cement, clay loam and sand was in good condition after two years. In fact, nearly all kinds of soils mixed with cement seem to have given satisfactory results, and Mr. Markwich says that "apart from mechanical stabilization, the soil-cement process is rapidly becoming the most important method of stabilization."

However, "During the past year the waterproofing methods of soil stabilization have probably aroused greater interest than any other process." Their main advantages are their applicability to cohesive soils; the very small percent of stabilizer required; the stability is less affected by deformation of the subgrade than is that of mixtures that rely on cementing action. A special powdered resin is the stabilizer used, 1.5% with loam in one case, 0.6% with sand-clay in another. The Laboratory is endeavoring to find a more plentiful substitute for the special resin. Several methods have been tried for covering the soil with an impervious membrane, but none have advanced beyond the experimental stage.

Rats in Garbage Dumps

In connection with its rodent surveys, garbage disposal was studied by the department in 15 counties of California. This included 14 cities in some of which the rodent situation was found to be acute. In one city, more than 500 rats were poisoned on the local garbage dump. In 25 other cities throughout the State, garbage dumps were inspected and advice given relative to keeping the rodent population in such places under control.

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come. WAR BONDS to Have and to Hold.

The Treasury Department acknowledges with appreciation the publication of this message by

PUBLIC WORKS Magazine

★ Let's All Back
★ the Attack...
★ with War Bonds!

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

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Well Troubles: Their Causes and Cures

(Continued from page 17)

shows that what was thought to be well trouble was really pump trouble. If there is any question about the cause of the trouble, remove the pump and try out the well with a test pump.

Acid Treatment

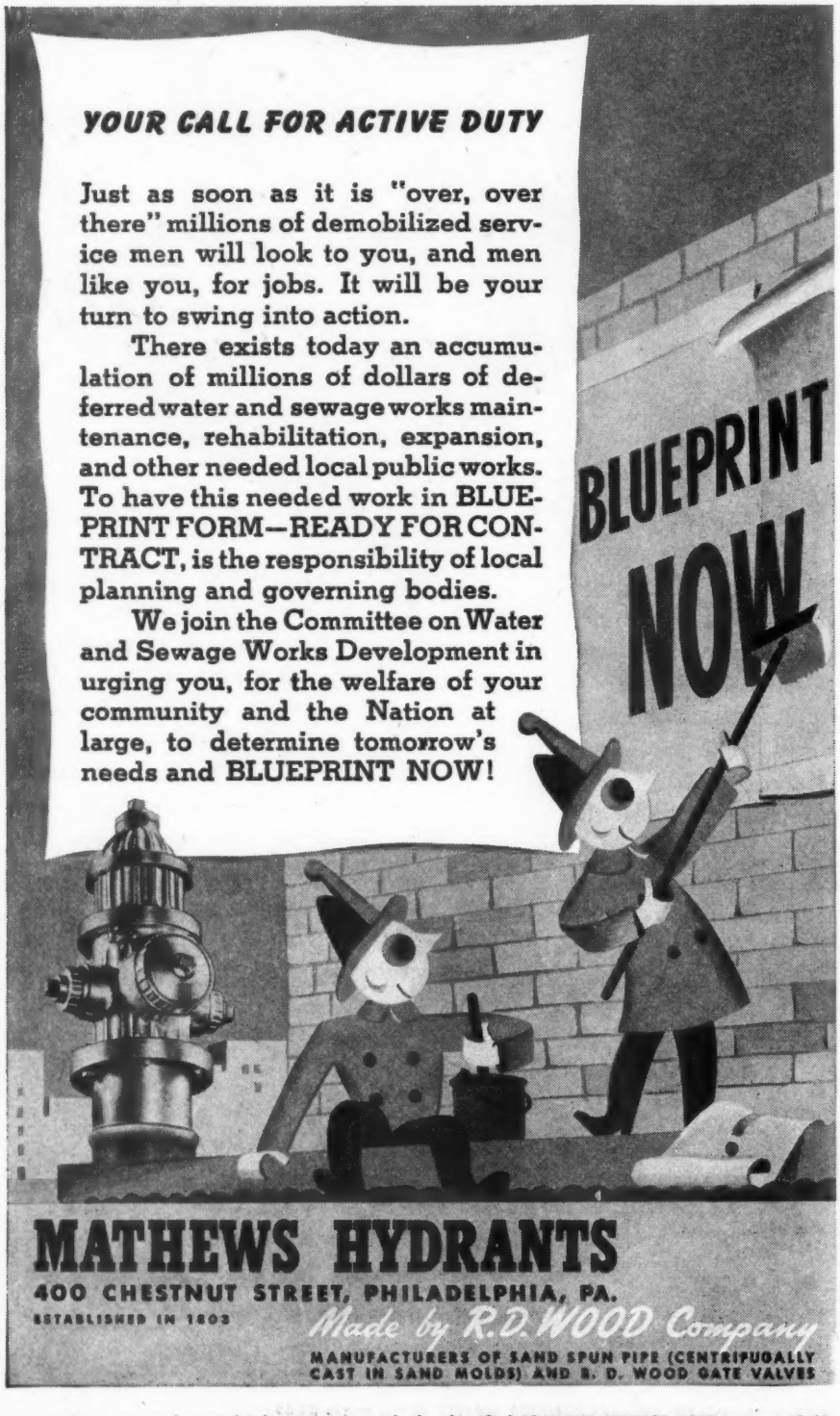
Screens are cleaned by use of acid, compressed air, water or gas, and dry ice. Acid treatment is the most popular and effective of these. Some companies have built up the idea that this process originated with them and that they had the sole right to use it; but this is not the case.

Some cases call for single acid treatment and some for double acid.

The Single Acid Treatment is made by using ordinary commercial muriatic acid, chemically known as hydrochloric acid. There are three commercial strengths, 18 degree or about 28% acid, 20 degree or about 31½% acid, and 22 degree or about 35% acid. The 18 degree strength is ordinarily used and can be obtained through any local drug store or plumbing shop in carboys which contain approximately 12 gallons each, weighing about 125 pounds. Enough acid should be provided to fill the screen with a little left over. Remember the specific gravity of acid is more than that of water and it will settle to the bottom. Experience has shown that the use of diluted acid or too small quantities of acid is false economy, either delaying the work or making it only partially effective.

To place the acid in the well a ½ inch, ¾-inch or 1-inch black iron pipe long enough to reach to the bottom of the well is used. This pipe should have a large "tee" for a funnel on the upper end. Lower the pipe until it is within a foot or two of the bottom of the screen. If the screen is more than four or five feet long, enough acid should be put in for five feet and then the pipe is raised up another four or five feet. While the acid is heavier than the water, it will mix with it readily, therefore, the acid is placed with as little stirring and agitation as possible. It is good practice to use up to 10 per cent more acid than required to be sure the screen is full before agitation with the tools is started. In handling the acid, use a glass or earthenware pitcher, or siphon directly from the carboy to the funnel by means of a rubber hose. Muriatic acid is not dangerous but it will burn the bare skin, so a pair of rubber gloves should be provided. Good ventilation is essential, especially in small, tight pump houses or in summer when there is no breeze, as gas is always given off during the process.

The acid is allowed to remain in the screen from one to two hours and then stirred with the pipe used to place it. This allows the weakened acid at the outside to be replaced with stronger acid from the inside. It is then allowed to stand for at least an hour and then stirred again. This alternate standing and stirring is kept up for a period of from 8 to 12 hours if time will allow. The well is then surged with a solid surge block for a few minutes to break loose any incrustation and force the remaining acid out in the formation. While this is being done, a small stream of water may be run into the well, if available. After the well has set for another period of from 2 to 4 hours it can be surged heavily for a short time and then


YOUR CALL FOR ACTIVE DUTY
Just as soon as it is "over, over there" millions of demobilized service men will look to you, and men like you, for jobs. It will be your turn to swing into action.
There exists today an accumulation of millions of dollars of deferred water and sewage works maintenance, rehabilitation, expansion, and other needed local public works. To have this needed work in BLUEPRINT FORM—READY FOR CONTRACT, is the responsibility of local planning and governing bodies.
We join the Committee on Water and Sewage Works Development in urging you, for the welfare of your community and the Nation at large, to determine tomorrow's needs and BLUEPRINT NOW!
BLUEPRINT NOW
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ESTABLISHED IN 1803
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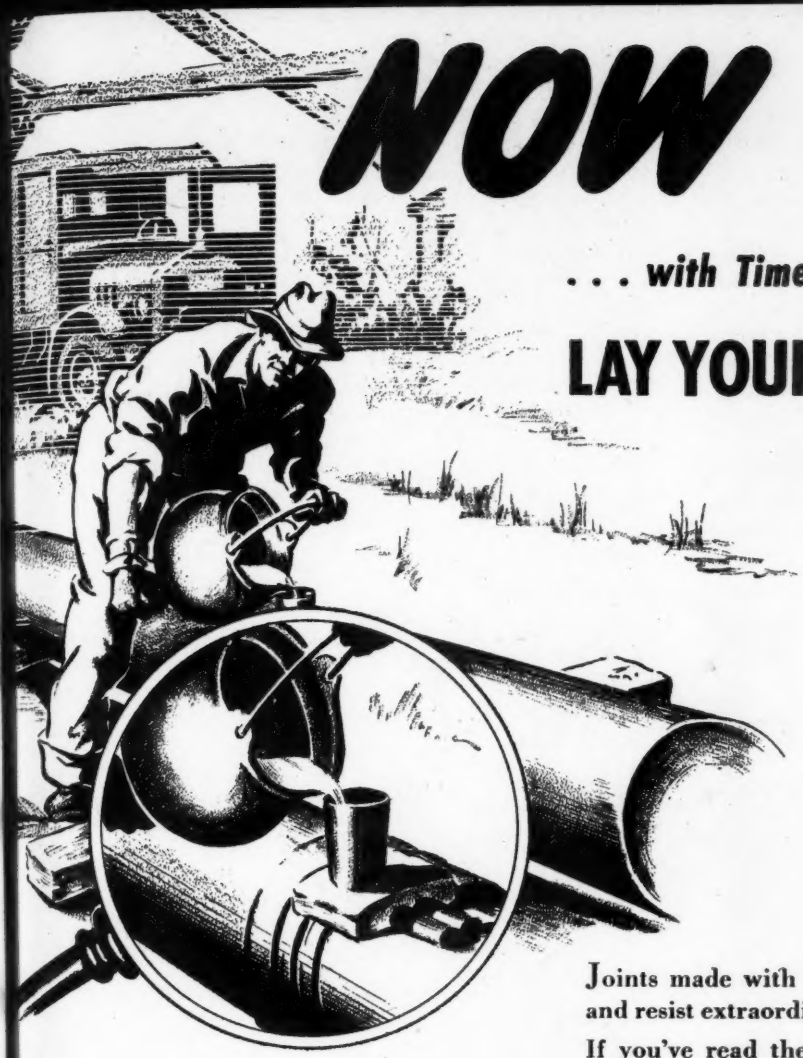
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES



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. . . with Time and Man Power at a Premium . . .

LAY YOUR WATER LINES TO *LAST*

AND *STAY OUT OF TROUBLE*

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EXTRA RESISTANCE TO THERMAL SHOCK

Joints made with *Tegul*-MINERALEAD show lower initial leakage and resist extraordinary vibration.

If you've read the Power Hammer Test Story, you'll check *Tegul*-MINERALEAD as tops in taking punishment.

As far as we know, *Tegul*-MINERALEAD is the only *practical* compound used in lines carrying hot water.

Tegul-MINERALEAD works at sub zero and at highest summer temperatures.

Tegul-MINERALEAD keeps away from troubles due to chemical change. Correctly mixed at factory, its ingot form admits no possible "shakedown," no matter how rough the ride from plant to point of use.

Tegul-MINERALEAD joints require no skilled labor or deep bell holes.

Weighing only one-fifth as much as lead, *Tegul*-MINERALEAD saves in shipping and handling costs. It is not a critical war metal or material.

Impervious to moisture, *Tegul*-MINERALEAD may be stored in the open regardless of weather . . . even of possible flood conditions.

SAVE TIME, LABOR . . . . MONEY TOO

BY USING

***Tegul*-MINERALEAD**

to joint your Bell and Spigot Main

★ ★ ★

IF YOU HAVE USED *Tegul*-MINERALEAD, all this won't be news. If *not* . . . then send for full information, including the Power Hammer Test Story mentioned above. You'll be glad you did. Address our head office at Mertztown, Pa. Or, for quick action in the field, write branch office nearest you.

★ ★ ★ ★

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of Mertztown Penna. Pennsylvania

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*SEATTLE 14, Wash., H. D. Fowler Company P. O. Box 3084

*Stocks carried at these points

cleaned out with the bailer. The routine can be repeated if it is determined feasible. Finally the well should be thoroughly pumped out to remove all traces of the acid.

Double Acid Treatment is used in localities where the formation is high in organic and clayey materials. The general procedure is the same as used in the Single Acid Method, except that sulphuric acid is used after one application of the muriatic acid. The reactions from using both acids are more pronounced as they tend to break down the organic and clayey material with considerable heat being generated and gas given off.

Special care must be used in handling sulphuric acid, as it is more active and dangerous than muriatic acid. It will destroy clothing and burn the flesh badly if rubber gloves are not used. As a precaution a package of ordinary baking soda should be provided to neutralize any acid spilled accidentally. After the work of placing the acid and surging is completed the well should be pumped until it is ABSOLUTELY free of all traces of acids. Tests should be made with litmus paper if necessary to determine that all of the acid has been removed. In some cases the disposal of the first acid-laden water is a problem. Unless it can be run into a sewer or otherwise safely disposed of it may be well to place water-slaked lime in the well to partly neutralize the acid before removing it. Acid treating with sulphuric acid should be done with the aid of tools and a derrick so that the acid can be handled promptly and safely without manual handling.

Dry Ice Treatment

Dry ice changes from the solid to gaseous form rapidly when placed in water, and if the well be closed after placing it therein the expanding gas is forced through the screen and loosens the material clogging the openings. Also it can be used after acid treatment to agitate the acid solution in the well in lieu of surging, but this is not recommended. The dry ice must be kept in air-tight containers until used and heavy gloves or ice tongs used in handling it, as it freezes bare hands quickly. The gas given off is suffocating if inhaled. It is well to break dry ice into pieces about 2" square before applying it.

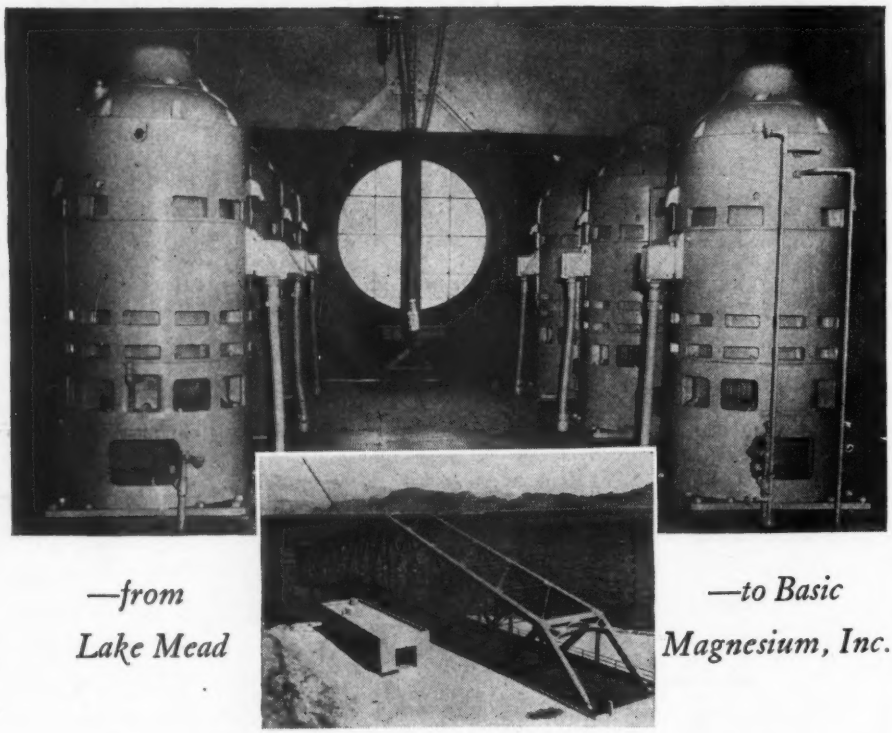
Ordinarily 10 or 15 pounds of dry ice will create enough commotion for the operator to judge the proper amount to use; then if feasible 25 to 50 pounds can be put into the well and the results observed. If the well is capped, a pressure gauge and relief valve should be provided to observe and control pressures. One thing to remember is that too much dry ice is liable to freeze the water in the well solid. This can be avoided by having at least 11 pounds of water in the well for every pound of dry ice used. The use of dry ice is not feasible in wells where the depth of water in the well is small in proportion to the well depth, as the gas generated is soon expended into the formation on account of the low head of water. Dry ice works better in deep wells with a considerable depth of water.

Other Methods

Compressed air is often used, either alone or before or after acid treatment, its sudden discharge into the well tending to loosen the accumulations on the screen if these are of the soft sludge type, but its use is not recommended for hard deposits.

Another method of loosening accumulations is to produce a shock by using a tight-fitting, heavy, solid

Making **MAGNESIUM** *with*
PEERLESS PUMPED WATER



—from Lake Mead

—to Basic Magnesium, Inc.

The colossal desert plant of Basic Magnesium near Las Vegas, Nevada, is making thousands of tons of "desert gold" annually for war use. When operating at peak capacity, Basic needs 100,000,000 gallons of water daily. It's Peerless' job to deliver this deluge of water. At Lake Mead, twelve miles away, six huge Peerless Pumps lift the water from the lake and boost it over mountain ridges and through desert stretches to the Basic plant. The direct-connected pumps (Peerless Turbine Type) are mounted on a special Cantilever bridge that reaches out over the lake to deep water. A typical war job that Peerless is proud to be a part of.

PEERLESS PUMPS
TURBINE, HI-LIFT AND HYDRO-FOIL

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301 W. Avenue 26, Los Angeles, 31, Calif. ★ 1250 W. Camden Ave., S. W., Canton, 6, Ohio
OTHER FACTORIES: San Jose 5 and Fresno 16, Calif.

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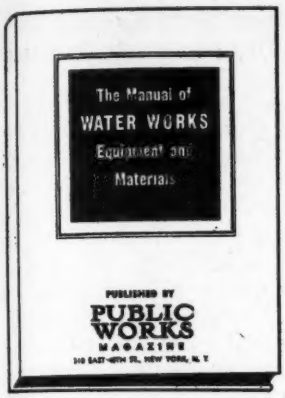

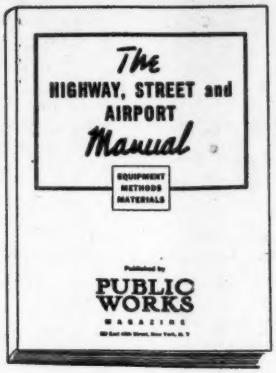

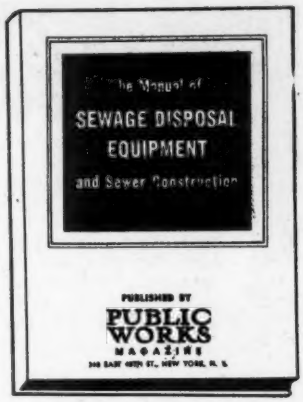

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surge block, which is raised and lowered rapidly with short, heavy strokes, thus causing pressure in the water rather than movement of it.

Chlorine is coming into more general use for opening up wells that have been clogged with growths of crenothrix. The chlorine is introduced in gas or liquid form into the lower part of the well in considerable amounts, the well meantime being pumped, then allowed to stand for a while and finally pumped out. If a well has been heavily treated with chlorine, this should be followed by dechlorination with sulfur dioxide.

The whole subject of reclaiming or reconditioning wells and screens can be summed up in one statement, namely, "Work of this kind is never entirely satisfactory." This is for the reason that working with an old well is like repairing an old house—after the work is all done it is still an old well.

The above is condensed from *The Johnson National Drillers Journal*, to which we are indebted for the illustrations also.

Portland's Postwar Sewerage Plans

The city of Portland, Oregon, has engaged engineers to prepare detailed plans and specifications for intercepting sewers and a sewage treatment works estimated to cost about $12,000,000, to be constructed as a postwar project. This is one of the major projects recommended by Robert Moses in his recent report on a postwar development program for the city.

The project includes sewers to intercept the flow from more than 60 outfalls from district sewer systems, and a number of large low-head pumping stations in connection therewith, these interceptors having a capacity of about 200 mgd; and a primary treatment plant designed to remove grease and settleable solids from about half that volume.

Agitation with a view to removing serious pollution from all waters of the Willamette river watershed has been active for many years, and the construction of Portland's project will be a long step toward this end. This project was first studied in 1933 by the engineering firms of Stevens & Koon and John W. Cunningham & Associates and reported on by the late Harrison P. Eddy. In 1939 an engineering board of review consisting of Abel Wolman, Wellington Donaldson, R. H. Corey and Carl E. Green made recommendations which are the general basis for the work now undertaken. The two engineering firms named above will act jointly in preparing the plans and specifications, with city engineer Ben S. Morrow cooperating. The construction will be under the direction of an engineering board consisting of the city engineer, Ray E. Coon and John W. Cunningham.

Beaded Traffic Stripes in Rhode Island

If at all possible, we would like very much to use more of the beaded traffic stripes next year. This reflectorized treatment which has proven of great assistance especially during fog is of great value in dim-out areas. Heretofore, it has been employed in no-passing zones on vertical and horizontal curves, but experiments have shown that a reflectorized stripe is not only visible in dim-outs but in black-outs as well which is not true of ordinary paint. This same treatment has been used advantageously on curbs in the direct line of traffic and at intersections.

From the annual report of George H. Henderson, Principal Highway Engineer, State of Rhode Island.

THE WASTEFUL USE OF PAPER

IN YOUR OFFICE CAN CRIMP A NAVY BROADSIDE

Against the Japs

YOU BET IT CAN. For the ammunition which our fleet fires reaches its destination protected by paper. And any paper you waste unnecessarily is just what the Navy and the Army need to do their job.

That's why Uncle Sam asks you to watch every project in terms of USING LESS PAPER. Whether it's tracing paper or a letter or specifications—think of it as a challenge to you and to your colleagues. Yes, a challenge to you to see how you can carry on your work and at the same time cut down and cut down and cut down on your department's use of paper.

Remember the whole country is being enlisted in this drive. You'll be a soldier in a mighty army of paper conservers.

And remember, right now, there's no home-front conservation job any more urgent or important than the conservation of paper and paper board.

If your community has not yet organized Paper Conservation Committees, why not start them yourself and now?

Use Less Paper Because

Each 500-pound bomb takes 12 pounds of paper for rings, tops and bottoms.

A fiber container for a 75-millimeter shell takes 1.8 pounds of paper board.

Each weapon part must be wrapped in greaseproof paper and in waterproof paper. A single shipping case of decontaminating apparatus requires 273 square feet of waterproof lining paper.

All kinds of paper are used by the Army, from vegetable parchment, .0015 inches thick, to heavy paper board and wallboard.

Use Less Paper These Ways

Use smaller printed forms. (Any competent printer, in consultation, can point the way to pronounced savings by these means.)

Use smaller letterheads for short letters.

Make scratch pads from stocks of obsolete letterheads, memorandum forms, and other unused inventory.

Cut the weight of paper stocks. (You tell the printer how long you expect a record to endure and he can tell you what stock to order.)

This advertisement prepared under the auspices of the War Advertising Council in co-operation with the Office of War Information and the War Production Board.

LET'S ALL USE LESS PAPER

Space for this advertisement contributed by PUBLIC WORKS Magazine.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Wartime Highway Maintenance

(Continued from page 13)

Aggregate No. 5 should be spread to a depth of 2½ inches. Tar RT-6, RT-7 or RT-8 should be applied at the rate of 0.8 gallon per square yard and mixed with the aggregate by means of a blade grader, drag, maintainer or mixing machine.

Penetration Macadam—The aggregate should be broken stone or slag, of No. 3 grading for the penetration course, and No. 79 stone, gravel or slag for the choke and cover for the seal coat. The construction steps are as follows:

1. Spread the No. 3 aggregate to a depth of 3½ inches, or the depth of the hole if it is less.
2. Roll or tamp until the dry aggregate is thoroughly locked together.
3. Apply 1.7 gallon of RT-12 per square yard.
4. Fill the surface voids with No. 79 choking aggregate.
5. Sweep and roll until the surface voids are thoroughly filled, but leave the tops of the penetration stone exposed.
6. Apply first seal coat of ¾ gallon of RT-12 per square yard.
7. Cover with approximately 30 pounds of No. 79 aggregate per square yard, sweep and roll in place.
8. Apply the second seal of 1/3 gallon of RT-12 per square yard and cover with approximately 25 pounds of No. 79 or No. 8 aggregate per square yard. Sweep and roll.

Cold Lay Tar Concrete—This material should be manufactured in a modern bituminous mixing plant with adequate control of grading, temperature and proportions.

The aggregate should meet the following grading requirements:

	Binder Course	*Top Course*
Passing 1½ inch sieve, percent	100	—
Passing 1 inch sieve, percent	70—100	—
Passing ½ inch sieve, percent	20— 60	100
Passing ⅜ inch sieve, percent	—	85—100
Passing No. 4 sieve, percent	5— 20	40— 75
Passing No. 8 sieve, percent	0— 5	25— 55
Passing No. 20 sieve, percent	—	15— 35
Passing No. 200 sieve, percent	—	0— 8

The mixtures should be proportioned as follows:

	Binder Course		*Top Course*	
	Stone	*Slag*	*Stone*	*Slag*
RT-8, 9 or 10, % by weight	3.0— 5.0	4.0— 6.0	6.0— 8.5	7.0—10.0
Aggregate, % by weight	95.0—97.0	94.0—96.0	91.5—94.0	90.0—93.0

Warco Winners !

WARCO-DUPLEX HYDRAULIC SCOOPS — Winners in the contest of fast, economical earth moving. Simple in design, with no pulleys or sheaves to wear out, they are sturdy machines with capacities for large or small scale operations.

Limited distribution now on WPB releases or approval — but ready for post-war construction.

WARCO HYDRAULIC CONTROL MOTOR GRADERS proved to be winners before the war. They are now holding their own on wartime construction jobs in all climates, under all conditions. They will continue to prove "Winners" in peacetime construction.

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The tar should be heated to between 150° and 250°F and the aggregate when combined with the tar between 100° and 135°F

Hot Lay Tar Concrete—This material must be manufactured in a plant as described under Cold Lay Tar Concrete.

The aggregate should meet the following grading requirements:

	Binder Course	*Top Course*
Passing 1½ inch sieve, percent	100	
Passing 1 inch sieve, percent	70—100	
Passing ½ inch sieve, percent	20— 60	100
Passing ⅜ inch sieve, percent	—	85—100
Passing No. 4 sieve, percent	5— 20	55— 80
Passing No. 8 sieve, percent	0— 5	35— 65
Passing No. 40 sieve, percent	—	14— 34
Passing No. 100 sieve, percent	—	6— 20
Passing No. 200 sieve, percent	—	5— 15

The mixtures should be proportioned as follows:

	Binder Course		*Top Course*	
	Stone	*Slag*	*Stone*	*Slag*
Tar RT-11 or 12, % by weight	3.0— 5.0	4.0— 6.0	6.5— 8.5	7.5—10.0
Aggregate, % by weight	95.0—97.0	94.0—96.0	91.5—93.5	90.0—92.5

The tar should be heated to between 175° and 250° and the aggregate when combined with the tar between 150° and 225°F. The mixture should arrive on the job at a temperature between 150° and 225°F and inside a 20° range within those limits.

Making the Patch—The sides and edges of the hole should be painted with a light application of RTCB-5 to bind the patch to the old pavement.

Patching mix should be placed so as to slightly over-fill the hole and then tamped or rolled in place. In penetration patching, the dry aggregate will be rolled.

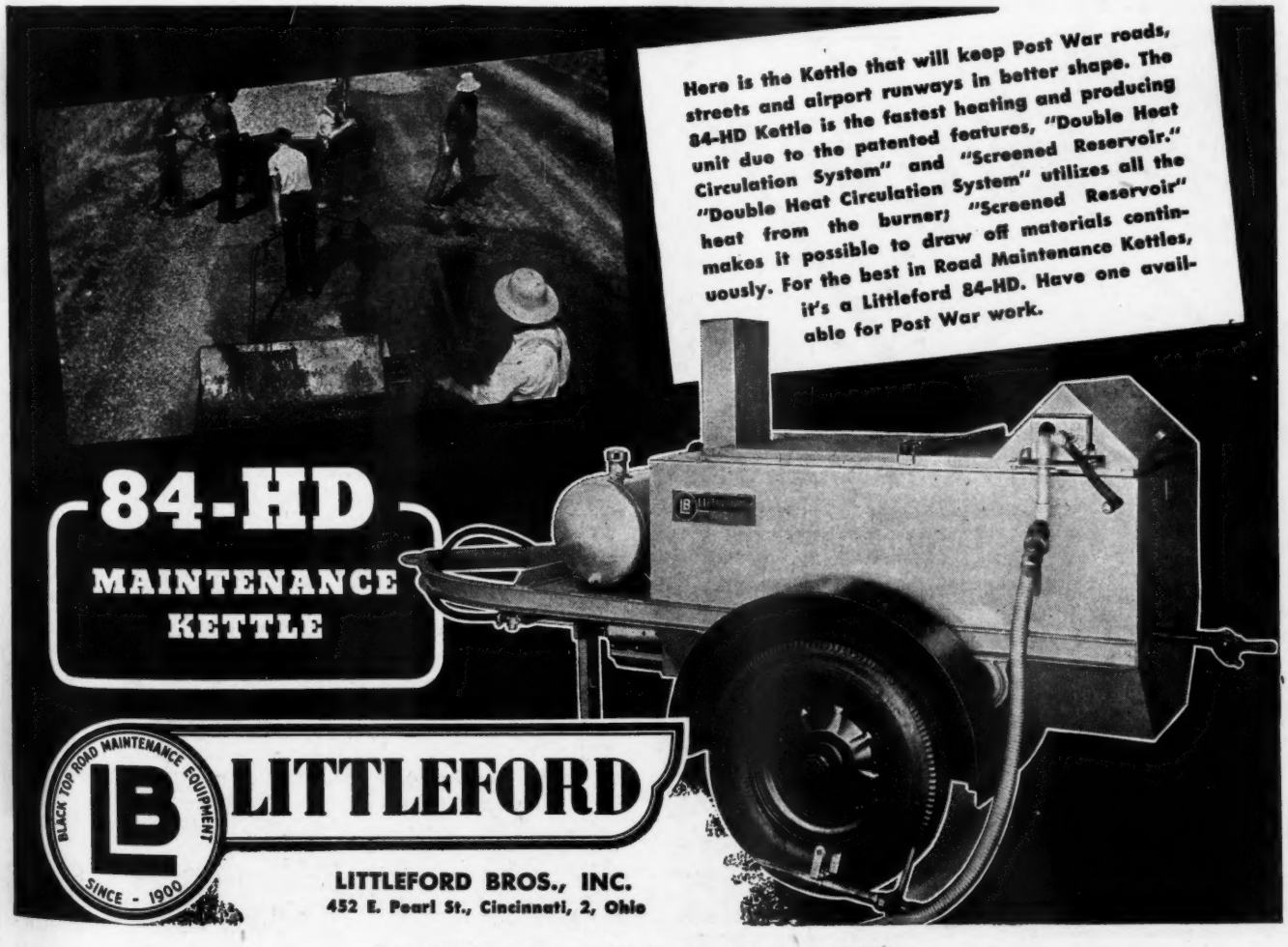
Patches of patching mixtures and cold-lay tar concrete should be sealed by painting with RTCB-5 and a light application of fine aggregate.

Patches made with road mix should be sealed with about ½ gallon of the same grade of tar used in the mix per square yard, with about 30 pounds of No. 9 aggregate per square yard as cover.

Hot-lay tar concrete patches using the top course mix or a combination of binder course and top course mix will usually not require a seal.

Re-Surfacing

In re-surfacing old pavements, an appreciable layer is placed over the existing pavement and rolled in place. This increases the strength of the pavement as well as providing a new water-proofing and traffic resisting surface. It will also improve the riding qualities of the pavement.


Here is the Kettle that will keep Post War roads, streets and airport runways in better shape. The 84-HD Kettle is the fastest heating and producing unit due to the patented features, "Double Heat Circulation System" and "Screened Reservoir." "Double Heat Circulation System" utilizes all the heat from the burner; "Screened Reservoir" makes it possible to draw off materials continuously. For the best in Road Maintenance Kettles, it's a Littleford 84-HD. Have one available for Post War work.
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CHARLES I. STANTON
CAA ADMINISTRATOR

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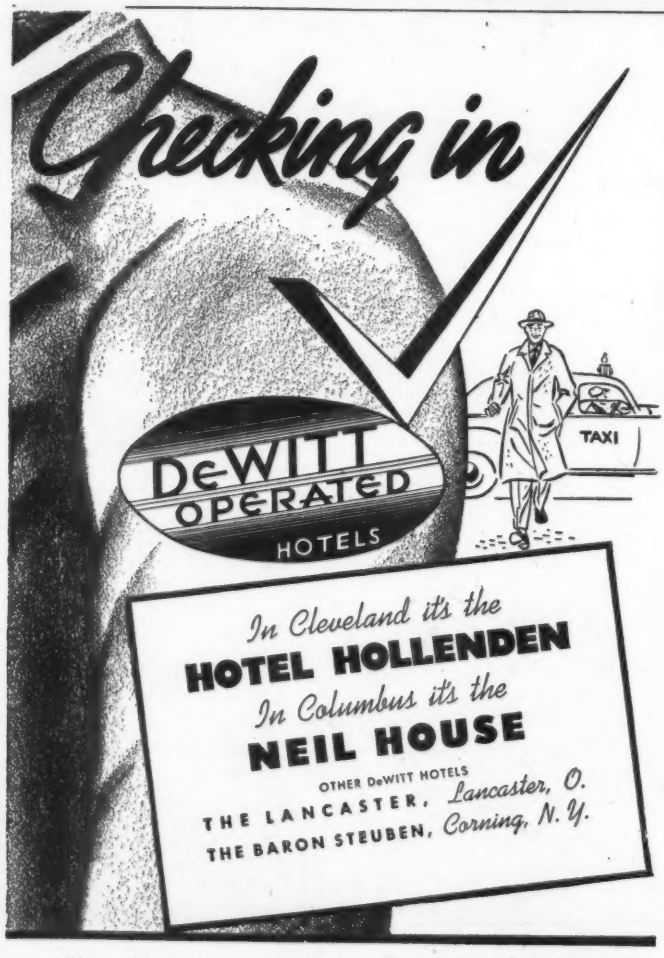
Engineers and Manufacturers of Airway and Airport Radio Equipment
SINCE 1922 IN RADIO AND ELECTRONICS



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The work may be done by using one of several different combinations of aggregate and tar.

Penetration Macadam—The method described under "Patching" will be satisfactory for the re-surfacing operation.

Road Mix—Aggregate can be spread and mixed as described under "Patching," and the work then carried on as follows:

1. Spread the mixture over the surface with the road machine so as to eliminate irregularities in the old road.
2. When the tar begins to set and becomes tacky, blade and drag if necessary until smooth, and roll thoroughly with a ten-ton three-wheel roller.
3. After the initial rolling, sweep in choke aggregate (No. 9) to fill the surface voids, and continue rolling.
4. Apply the first seal of tar at the rate of 0.3 gallon per square yard, cover with aggregate and roll.
5. Apply the final seal coat at the rate of ¼ gallon per square yard, cover with seal coat aggregate, and roll to the final finish. It is best practice to delay this final seal until the entire job is finished and apply the seal coat over the entire length of the road at one time. If desired, the road may be opened to traffic after the first seal, and the second seal given at a later time.

Tar Concrete—Both types of tar concrete may be used for resurfacing. The top course may be used alone for depths up to one and one half inches, and in combination with the binder course for greater depths. Each layer is spread by a spreading machine and rolled in place.

Conclusion

Highway maintenance organizations must be given every encouragement to carry on adequate road maintenance. To obtain the best results, the operations should not be confined to repairs after failure, but should also strengthen existing roads to *prevent* failures. The vital highway system must be kept in shape to carry the necessary traffic even though it may cost more in money, labor and materials than it has ever cost before.

What the Engineer Should Know About Tropical Diseases

(Continued from page 15)

given to the preparation of a complete article on the subject.

Mosquito control as a postwar project is worthy of consideration. A careful study of the need of control should be made and the State and local boards of health should be consulted. Provision should be made for a continuing project; any proposal based on continuing operation for only one or two years is unsound unless there are unusual circumstances justifying it.

Water-Borne Diseases

Cholera has not been a problem in this country and with our present methods of water treatment it is unlikely that it will be. It is notorious for its ability to spread and has existed in this country in the past, but medical authorities consider its importation, as a result of the present war, unlikely; and its spread, even if introduced, extremely unlikely.

Amebic dysentery was brought vividly to the attention of American engineers by the epidemic occurring in connection with a World Fair of some ten

years ago. Though around 8% of the population of various sections of this country appear to harbor the cysts of Entameba histolytica, which cause the disease, amebic dysentery has never been an important health problem here. It seems unlikely that the addition of a few more carriers, relatively speaking, will materially change the situation.

More careful operation of sewage and water treatment plants is desirable as a safeguard. It has recently been shown that our present methods of sludge treatment—digestion and drying—do not destroy certain ova and cysts that may carry disease. Perhaps improvements in this procedure will be needed. In water treatment, better conditioning of the water, elimination of sanitary hazards permitting raw water to pass into the distribution system, better control and maintenance of filters, and effective chlorination will eliminate danger of the spread of amebic dsyentery. About 1 p.p.m. of residual chlorine, with a contact period of 30 minutes, is required to kill the cysts. Breakpoint or super- and de-chlorination may be desirable. However, a filter properly maintained, handling well-conditioned water, and operating at a rate not greater than about 3 gallons per square foot per minute, should prevent the passage of cysts.

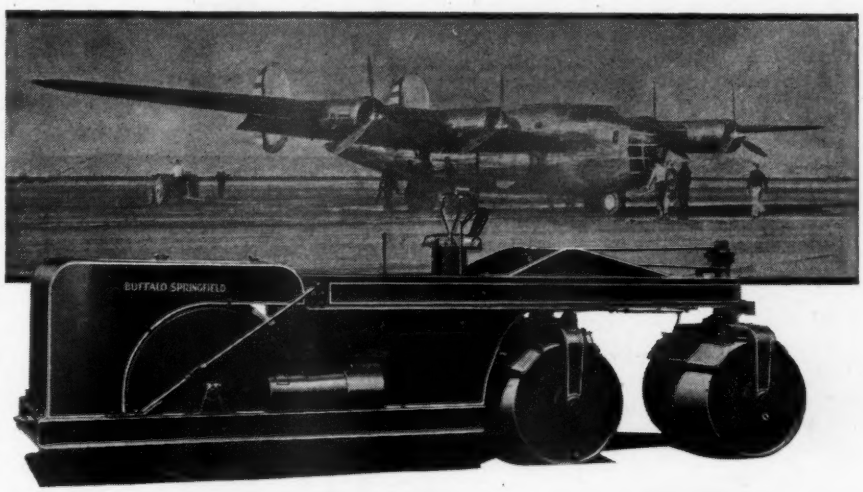
Other Diseases

Schistosomiasis, known also as bilharzia in some areas, is contracted by wading or swimming in waters in which there are snails of the Planorbis family. By some it is thought possible that persons infected overseas will discharge in their urine or feces fluke eggs which may infect American snails of the same family. It is generally thought unlikely that this will occur because it is believed that the capacity of the snails to serve as vectors is restricted to specific species not found in this country. Australian and British troops in World War I took the disease home from the Middle East but it did not persist. If it should become a problem, more careful sewage treatment would be desirable; also, in water plant operation, prior treatment with copper sulphate and chlorination as for ameba cysts would be necessary. In this regard, schistosomes or cercariae appear to be sensitive to chloramines, and a residual of 1 p.p.m. with a contact period of 30 minutes is effective.

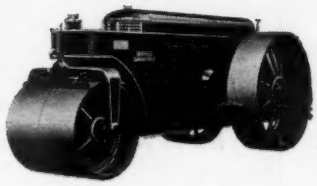
If schistosomiasis became established, the pressure filters now used in so many swimming pools could not be considered fully effective protection. The cercariae have been shown to penetrate 30 inches of sand under many conditions, and it is very likely that filters would be ineffective at rates in excess of 3 or 4 g.p.m. per square foot; possibly operation at even lower rates would be unsafe. Copper sulphate treatment and chlorination would be effective.

Rat-borne typhus is, and has been, quite common in our Southern States. Rat control is the solution and is being carried on in many Southern cities. It should be extended. New and simpler methods of control have been developed. Rat control should be seriously considered as a postwar project by many communities. The local health department can supply data as to its necessity from the health viewpoint.

Louse-borne typhus is a more deadly disease. It is this type that we read of in newspapers as being responsible for so many deaths in the war areas. For centuries, typhus has followed armies. It is particularly a cold-weather disease because that is when conditions are most favorable for lousiness. Control depends on cleanliness. The provision of disinfectation facilities to delouse clothing, and of baths is essential. Methyl bro-



VICTORY *in* 1944?



With American made construction machinery leveling mountainside and jungle ahead of our bombers and those bombers leveling the enemy at every contact, victory will, in due course, be ours.

The Buffalo-Springfield organization is proud of the contribution its product is making in the service of our country.

THE BUFFALO-SPRINGFIELD ROLLER COMPANY
SPRINGFIELD, OHIO

BUFFALO-SPRINGFIELD ROLLERS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

mide has recently been developed as an excellent small-scale disinfector, and it may be equally valuable on larger problems. For the engineer, a principal problem is the supply of plenty of hot water through simple and cheap shower heads.

Waterworks Engineering In Disaster

This is the title of a technical manual of 147 pages prepared by the Sanitary Engineering Section of the Medical Division, Office of Civilian Defense, "for the use of waterworks and public health engineers who may have need for this type of information in their planning to meet special problems that may arise as a result of wartime or natural disasters. The publication deals with technical matters concerned with emergency operation and maintenance of waterworks systems.

"In the compilation of this manual an attempt has been made to bring together all material of value related to this subject. In addition, certain techniques and procedures are presented in a manner to serve as a ready reference for engineers confronted with emergency waterworks problems. The manual also deals with 'good waterworks housekeeping methods' that are not only of value under emergency conditions but are essential in regular waterworks practice."

While prepared by the OCD, its usefulness is by no means limited to preparations for or repairs after war disasters, or in fact disasters of any kind. All features of maintenance and repairs are discussed; contamination and disinfection; fire protection; hydraulics; laboratory control; and twelve appendices dealing technically with laboratory tests; discharge measurements, and analyzing flow in distribution systems. In fact, only two of the twelve chapters and two of the twelve appendices deal chiefly with emergencies.

This book was intended for "Regional Offices, State Councils of Defense, State Water Coordinators, Waterworks and Public Health Officials" and is OCD Publication 2022; obtainable from the Office of Civilian Defense, Washington 25, D. C.

A Storage Lagoon For Wastes From Canning Company Plants

(Continued from page 22)

and corn made up the greater part of the pack at Fairmont, but variations were presented in computing total volume of wastes due to other conditions. Our plants had, in the past years, processed corn in two forms, cream style and whole kernel. Part of the product was frozen and the indication was that frozen foods would be more popular in coming years. The amounts of wastes varied in the two processes. The canning plants had been using water from the municipal supply, which was metered and the volume of this was available; but at the same time they had used a large amount from their own wells and no record of the pumpage had been kept and the amount of water used from this source was therefore indeterminate.

It was known that the capacity of the original 12" sewer line mentioned at the beginning of the article insufficient to handle the wastes, and flooded conditions

SAVE MANPOWER!

The need for conserving manpower is currently stressed due to war-time conditions. This has influenced the use of motor operated valves on many war projects.

After the war, you may find it well worthwhile to consider using these valves in your water plant where frequent operation is necessary.

Write for information

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A MAIN LIKE THIS

easily can lose 50% of its original capacity through incrustations and foreign matters, which reduce pressure, quantity and quality of water, as well as increasing pumping costs and keeping insurance rates up.

We Restore 95% Capacity

through cleaning such mains the "NATIONAL way" in from 5 to 7 hours, at night if necessary. Service can be resumed very quickly in any emergency.

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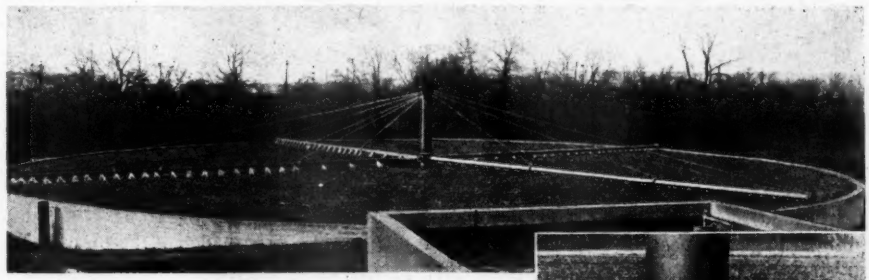
When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

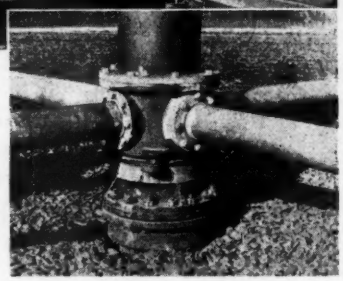
Itimized Cost of Constructing the Lagoon

Quantities		*Price*	*Cost*
11,388.5	cu. yds. ditch excavation	$ .32	$3,644.32
14,138.4	cu. yds. clay excavation and embankment for dike core	.32	4,524.29
11,978.5	cu. yds. clay or mixed clay and top soil for dike fill	.22	2,635.27
40	cu. yds. hand placed rip-rap	6.00	240.00
554	lin. ft. 12″ vit. sewer in place	.80	443.20
20	lin. ft. 12″ cor. culvert pipe in place	1.50	30.00
125	lin. ft. 18″ C-14 concrete culvert pipe in place	1.80	225.00
50	lin. ft. 24″ C-76 concrete culvert pipe in place	3.05	152.50
100	lin. ft. 24″ C-14 concrete culvert pipe in place	3.55	355.00
12	cu. yds. concrete spillways	27.00	324.00
1	weir chamber and discharge spillway		490.00
1	screen chamber and diversion manhole		660.00
1	discharge manhole, complete		420.00
1	standard sewer manhole, 6 feet deep		84.00
	Total construction cost		$14,227.58

at the green houses occurred on days of heavy pack or even moderate pack. It was necessary to provide for some growth and enlargement of the plants, so a 15″ sewer (giving nearly double capacity of the old 12″ sewer) was decided upon. Also a new 12″ branch was constructed to the No. 2 plant. The new outflow sewer was constructed by a WPA crew and consisted of a mile of 15″ vitrified sewer pipe with a capacity of 1.9 million gallons per day. The lower 600 feet of sewer is entirely on the lands of the Canning Company, covered by easement to the city, and provides a point where 15 feet of fall is available for gravity flow to any future purification works which might be needed prior to discharge into the lagoon. However, this 600 feet traversed a low area where it was necessary to fill to grade and cover the pipe with earth sufficient to protect it from displacement or freezing.

At the outlet of the lagoon is a 24″ shear gate, placed in a manhole just inside the dike, from which the effluent passes under the dike in tongue-and-groove pipe to a reinforced concrete weir chamber and headwall at the creek bank. Removable planks form the support for a rectangular weir and the depth of flow over the weir may be read on a gauge along which a float-operated pointer moves. When it is necessary to discharge from the lagoon at times of medium or light flow in the creek, a definite dilution ratio can be maintained by reading the previously mentioned water gauge in the creek and determining the effluent flow over the discharge weir. However, this careful ratio determination may not always be necessary, as usually the creek is at flood stage during the month of May or June, before the canning season opens, and the larger part of the stored wastes can then be discharged without danger of causing a nuisance at any point in the creek.





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For Trickling Filter System of Biological Treatment

The Trickling Filter Method of secondary treatment, recognized as one of the most successful means of sewage purification, will equal, and in some instances surpass the performance of more costly and complicated installations. Its advantages include:

LOW OPERATING COST — COMPARATIVELY LITTLE ATTENTION — EFFICIENT OPERATION LESS SUBJECT TO DISTURBING FACTORS THAN OTHER METHODS.

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THESE FURTHER FEATURES PROMISE UNUSUALLY LONG LIFE.

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- **Extra Heavy Steel Guy Rods, equipped with turn-buckles for correct distributor arm alignment.**

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Further details of the CARTER ROTARY DISTRIBUTOR are given in our Bulletin PW4401, which will be mailed upon request.

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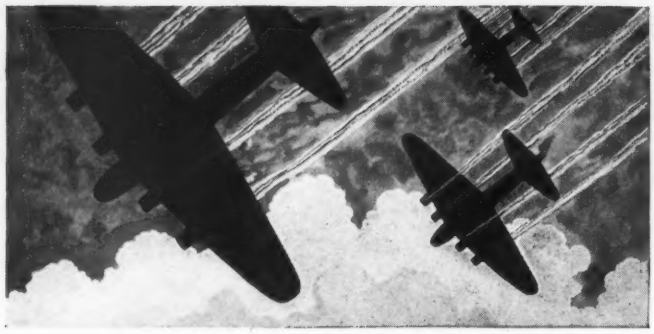

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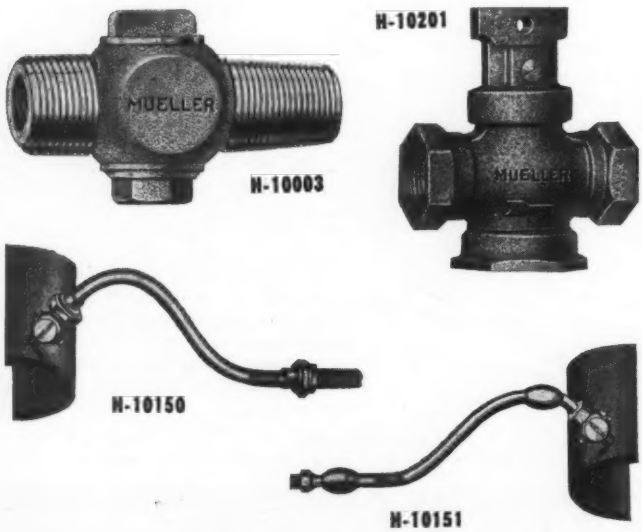

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The following design data for the lagoon were decided upon:

Estimated strength of the waste—3,000 ppm of 5-day B.O.D.
Estimated minimum daily flow..... 100,000 gals.
Estimated maximum daily flow..... 900,000 gals.
Estimated minimum monthly flow..... 3,000,000 gals.
Estimated maximum monthly flow..... 25,000,000 gals.
Products packed or processed—peas, corn, corn and peas, and lima beans.
Dates of beginning and end of canning season—June 15 and October 15.

The engineering required included a topographical survey of the site with one-foot contour intervals, preparation of the plans and specifications, and supervision of construction. Borings were taken at various points along the line of the dike to determine the location of any pervious soil strata. Few sand or gravel deposits were found, the borings indicating either a black loam soil or the usual yellow clay found in this locality. The area of the lagoon was 25.8 acres; perimeter, one mile; maximum fill, 9 feet; width at top of dike, 8 feet; side slopes, 1:2. With a free-board of 3 feet, the average depth is 5.9 feet. The capacity of the lagoon to the free-board point is 54,621,000 gallons. A center core of compacted clay, 8 feet wide from bottom to top of the dike, was provided. All the work was done under contract.

The costs were as shown in the table on page 47.

Cost per million gallons of storage volume, $261.

The lagoon has now been used for two canning seasons, 1942 and 1943, but during 1942 the construction and completion was delayed until September 1st so that only a part of the canning wastes, approximately 37,250,000 gallons, was stored. There has been no seepage. Rainfall or evaporation is not allowed for.

Further data available concerning the operation are as follows:

Maximum 5-day BOD, 3,165; average, 2,000. At the time of emptying, April 1, 1943, the 5-day BOD was 340 ppm. The rate of emptying, seven million gallons on the first day, five million gallons on the second day, pH 7.6. Dissolved oxygen contents were: in the lagoon, O.O.; in Center Creek above the outlet of the lagoon, 10.57; one mile down stream, 8.16; thirty miles down stream, 8.32. No appreciable amount of sludge was noticeable in the bottom of the lagoon after emptying.

During late summer and fall some odors were noticeable at times around the lagoon, and at some distance away when carried by the wind. We have made an investigation of treating the wastes with sodium nitrate to supply the needed oxygen and lessen the odors, but nothing has been done to date owing to the present high cost of the chemical and the demand for it for war purposes.

The dike was constructed by E. W. Rosenwinkle Construction Company, Fairmont, Minn., using the following equipment:

1 Caterpillar D-7 and LeTourneau 10 cu. yd. scraper.
1 Caterpillar 60 and 6 cu. yd. LeTourneau scraper.
1 Caterpillar 28 and blade scraper.
1 Allis Chalmers 35 dozer.
1 LS 40 Speeder dragline.
4 Ford 1½-ton mucker trucks.

C. H. Gould, Fairmont, Minn., constructed the entrance sewer and concrete work. C. J. Meister is general manager of the Fairmont Canning Company, Dr. E. W. Eichelberg is the bacteriologist. E. B. Nelson is Mayor of Fairmont.

Laying 24 in. cast iron pipe in Tampa, Fla.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Postwar Municipal Finances

The postwar financial status of the average municipality will depend to a large extent upon its management during the remainder of the war period. Poor financial management can bring trouble even for those communities which now seem favorably situated economically. By and large, however, the combination of larger revenues, controlled expenses and reduced debt is placing most municipalities in the best fiscal condition in some time. They should have the financial strength to play a large part in helping to solve the social and economic problems which will arise in the readjustment period after the war.[F9*]

Reconditioning a 36-Inch Steel Pipe Line

In 1943 the Metropolitan Water District of Southern California removed and reconditioned 11 miles of 36" pipe of ¼" and 5/16" welded steel plates which had been built in 1934, and coated with asphalt inside and out. Most of the pipe was laid with 3 ft. to 20 ft. cover. Where this was in streets it was excavated by a trenching machine; elsewhere by a dragline, the two center teeth of the bucket being removed to prevent damaging the pipe. The bottom half of each joint was cut from the inside with an oxyacetylene torch, and the top half by torch from the outside as soon as the joint was uncovered. The 30 ft. length of pipe was then removed and trucked 30 mi. to the reconditioning plant. Here all the old coating was removed, the pipe sandblasted and given a coal-tar enamel coating 3/32" thick on the interior and ⅛" on the outside; the latter being coated with ¾" of mortar. Two-thirds of the mortar was gunited on, but because of scarcity of guniters the other third was applied by rapidly revolving brushes that thru it onto the pipe as it revolved. Applying the gunite without using reinforcing mesh was tried to avoid use of critical steel but this was found to be impracticable. In relaying the pipe, welding had been specified but because of scarcity of experienced pipe welders, the joints were made with a lock-joint assembly with rubber gasket, a steel ring being welded on the spigot end, with a groove for a round rubber gasket to fit between it and the bell at the end of the adjoining pipe section.

The old asphalt coating on the interior was burned off with torches using diesel oil that were shoved inside the pipe, and this so heated the pipe that the outside coat melted and ran off. Then the ends of the pipe were cut square and ground smooth; out-of-round or dented places were then remedied by means of a rolling machine, the spigot ring welded on and the other end belled to 37⅛". The pipe was next shot-blasted, using No. 30 and No. 50 steel grit, and inspected for pitting and pits 1/16" deep or more were welded and the welds ground down to the face of the plate. Most of the pits were found in the bottom of the pipe where the coating had been punctured by rocks; in some cases tree roots were imbedded in the coating all the way to the steel. The pipe was then coated inside and out in the customary way.[A25*]

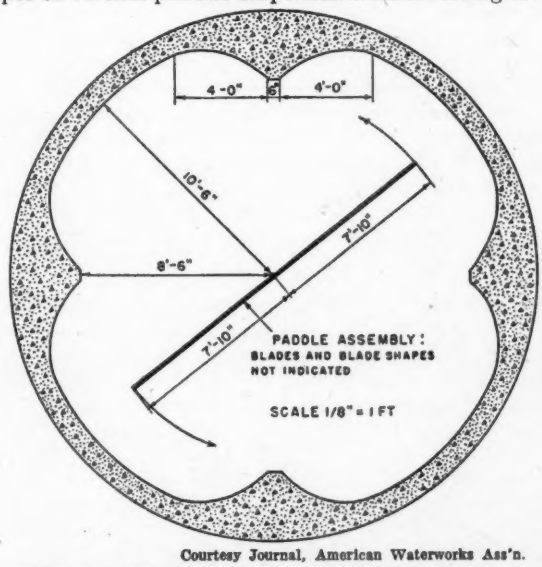
*See Bibliography in the March issue.

Reconditioning a Steel Pipe Line in Place

Riverside, Calif., has reconditioned 5,500 ft. of 36" and 1,850 ft. of 3" steel pipe in place, the line being out of service from Jan. 15 to March 7. This line was laid in 1927, protected externally by gunite but with no interior coating. Inspection in 1939 showed enough tuberculation to make reconditioning advisable. Mechanical scraping was done by the Flexible Sewer Rod Equipment Co., using a special scraper tool which passed around two 90° ells, one of 36" radius and the other 9 ft. radius. Manholes for inserting the tool were cut 1,000 ft. or less apart. After this the city used a special sand-blasting machine for blasting the pipe. The pipe was cleaned before the sand-blasting, and 90° of the steel grit abrasive material was therefore recovered in condition to be used again. Most of the pits were .047" to .063" deep, one extending entirely through the 3/16" plate. Barrett coal-tar enamel was applied with Tampico daubers; pinholes were located with an electrically energized detector brush and repaired. The cost was about 20% of the replacement estimate.[A26]

Design of Vertical Flocculation

In designing vertical flocculation units for a water treatment plant for Martinez, Calif., the authors introduced new features aimed to expending a significant portion of the applied energy in producing eddy currents, which play a chief part in floc agglomeration. To effect this, they tested the effect of different cross-sectional shapes of vertical paddles suspended from revolving arms;



Courtesy Journal, American Waterworks Ass'n.

Alcove (clover leaf) design for a circular vertical concrete flocculating tank.

and provided alcoves along the interior walls of the flocculation tank. Of six cross-sections of paddles tested, the best were an inverted angle of about 60°, a half circle, and a half hexagon. Either shape will maintain the necessary momentum, and the long, relatively narrow, vertical slots between the paddles are expected to be regions of cross-currents promoting the formation of favorable eddies.

"To develop eddy currents, and at the same time reduce the tendency to purely rotary motion, which is believed to be relatively ineffectual in generating such eddy currents, designs have been made of a modified clover-leaf type of construction." The Martinez plant includes three vertical circular tanks 20 ft. in diameter and 12 ft. deep, each divided into two by a horizontal bulkhead, the tanks operating in series. Each tank contains 24 paddles, 12 in each compartment, the paddle clearances varying in proportion to the distance from the central shaft. These revolve at 2.74 rpm in tank No. 1, 2.04 in tank No. 2 and 1.34 in tank No. 3. It is estimated that the driving motor for No. 1 must have a capacity of 0.63 hp, that for No. 2, 0.26 hp, and for No. 3, 0.07 hp.[A37]

Scraping Asphalt Lining From Steel Pipe

In this job, 4,100 ft. of 24" steel pipe was cleaned of asphalt inside and out preparatory to sand blasting and enameling, the asphalt being scraped off. "Asphalt can be burned from pipe but there is danger of warping and other disadvantages. The method described is particularly applicable where the asphalt dip is still fairly fresh and resilient. It is impractical to blast such a surface due to the adhering of the asphalt to the grit."

This pipe had been in the ground for 12 yr. but the asphalt coating and lining were still alive and resilient enough to become soft and gummy in the sun. The pipe had been fabricated in 30 ft. lengths and these connected in the shop into 60 ft. lengths by welding; the 60 ft. lengths being connected in the field by bell-and-spigot joints calked with cement. In removing the pipe from the trench, the cement joint was broken by raising and lowering the free end of a 60 ft. length. The asphalt was removed from the outside of the pipe by use of hand scrapers. For removing the inside lining, a special machine was devised having 6 scrapers on the ends of lever arms held against the pipe surface by springs and rotated by a pneumatic air drill at 4.20 rpm. This machine was pulled through the pipe by a ¼" cable, then through again in the reverse direction. The total cost was $2,577, not including removal from the ground and transportation.[A27]*

Designing Steel Pipelines

For calculating the flow capacity of steel pipe lines, the Scobey formula is commonly used for unlined pipe and the Hazen-Williams formula for lined pipe. The latter must be used with care for pipe above 36". Pipe lined with coal-tar enamel by A.W.W.A. specifications seems to retain indefinitely a capacity represented by a coefficient C of 150 without bends or other specials, reduced to perhaps 145 by bends, valves, etc. The standard thicknesses give sufficient strength to provide for water hammer. The wall thickness to resist internal pressure is ordinarily determined by the Barlow formula, plus a constant for thickness tolerance or corrosion; the present tendency being to use yield strength rather than ultimate strength, and omit the constant if the pipe is well protected against corrosion. But it must be thick enough to prevent damage to the lining by handling, and to provide the necessary strength if the pipe is to act as a beam between supports. In the latter case, deflection is apt to be the critical factor for small pipe, but for large pipe the support at the piers usually controls.

Field joints are usually Dresser type couplings or welding, the former for joints on pipe 24" and smaller. Where joints are welded, the inside lining must be replaced after welding. Specifications for field welding are being prepared by the A.W.W.A. Steel Pipe Committee Expansion joints are seldom necessary on buried lines except at valves, pump housings etc. On bridges the expansion joints on pipe lines should be at the same points as the bridge expansion joints. On slopes, the expansion joint is placed adjacent to and on the down-hill side of the anchor point. Air and vacuum valves should be placed just down stream from each across-the-line valve in a pipe line; at all high points where the line will act as a true siphon when draining or in case of breakage or wash-out; at abrupt changes in grade where the slope increases sharply; and on long flat stretches at intervals of about 1,000 ft. Pressure air-release valves should be placed at each summit where air entrained in the water may accumulate and form an air lock. All air valves should be protected against damage and freezing by placing in non-air-tight housings.[A23]*

Reconditioning Used 44-Inch Steel Pipe

FWA is installing 22,000 ft. of 44" steel pipe belonging to San Francisco, which has discontinued its use, for the city of San Diego. The specifications require that the pipe be excavated, all coating removed by burning, sand— or shot-blasting or other means; pits, cracks, holes or other defects be repaired by electric arc welding and patching; and expansion bells be formed and a steel band be welded on the spigot end. The pipe is to be reinforced by winding directly on the cylinder, steel rods of sufficient size and spacing to give the strength to withstand the heads of 300 to 400 ft. to which the pipe will be subjected; the spacing to vary from 1½" to 4", and the rods to be welded to the cylinder at the ends and at intermediate points to maintain spacing. Then a ¾" spun cement lining is to be applied inside, and a coating on the outside 1" thick but not less than ⅝" thick over the rods; this to be applied by guniting or revolving brushes.[A28]*

Cement Lining Cast Iron Pipe

Three California cities told of their experiences in lining cast-iron pipe with cement mortar by the Tate process. (This process has been described in PUBLIC WORKS). San Diego lined 11,200 ft. of 4" pipe and 7,115 ft. of 6"; Oakland, 7,762 ft. of 6" and 3,431 ft. of 8"; and El Centro, 4 miles of 4" with a later contract signed for another 2 mi. All contracted to do all the work themselves except the actual lining, and all agreed that this was unsatisfactory and that it would be better to have the Tate Co. contract for all the work, or the city do all the work and pay the company a royalty. In San Diego the total cost was $1.86 a foot and new pipe would have cost $3.70. In Oakland, lining 6" pipe cost $1.665 a foot and 8" pipe $2.69, while new pipe would cost $3.10 and $3.82 respectively. In El Centro the contractor's prices were the same as in San Diego, 70 cts. per ft. for 4" pipe, but the city's work cost only about 68 cts. as against $1.13 in San Diego.

In San Diego the lined pipe gave a flow capacity representing a value of more than 120 for C in the Hazen-Williams formula. In Oakland, C was increased from 64 to 125 based on the reduced area, or 109 based on the nominal original area. In El Centro, fire hydrant flows were increased 100% to 400% by lining.

All found projecting knobs and ridges in the pipe, which had to be ground down by a grinding wheel drawn through the pipe; in Oakland some of these ridges were ½" high and 2" or 3" long. Some pipe nominally 6" was found to be 6¼", other sections as small as 5½" just back of the hub end. These lengths had to be removed, as did others where lead had run inside the pipe in jointing. Corrosion by the highly mineralized water at El Centro was so great that only two out of more than 100 valves uncovered were suitable to be put back into service, these two having been installed recently.

While the mains were being lined, Oakland kept its customers supplied by means of 2" pipe laid on the surface along the section being lined. About 1500 ft. of 2"

*See Bibliography in March issue.

pipe was made up with two 2x2x¾ in. tees at 20 ft. intervals. Each tee had a ¾ in. curb cock and a ¾ in. Chicago air hose coupling for service connections. The pipe was made up in 100 ft. lengths with unions for convenience in moving. The connections for the service taps were made of ¾ in. air hose with a ¾ in. Chicago coupling at each end.[A29*]

Victory Garden Rates and Problems

Of water companies or departments supplying 80 California communities, those representing 60 made special rates for Victory gardens. Most of the rates fell into 3 general classes: 1. For metered services, a special rate for a specified volume of water per unit area. This applied to 44 communities. 2. For flat rates, various methods. 3. Miscellaneous methods. Under the first method, a minimum size garden, usually 300 or 400 sq. ft., was mandatory, and in some cases a maximum—5,000 to 10,000 sq. ft.—was set. For the area applied for, a definite amount, usually 2 to 3 cu. ft. for the season, was given at a very low rate, the average being 4 to 5 cts. per 100 cu. ft. In some cases a seasonal rebate or credit was given, in others the reduction was applied to monthly payments.

Most gardens ranged from 600 to 3,400 sq. ft., average 2,000. About 20% of the domestic customers received these rates. For most companies the revenue for 1943 exceeded that for 1942 by more than the victory garden rebates; due chiefly, however, to increase in customers or industrial revenues. The chief difficulty in applying these rates was in explaining them to the customers; some were so complicated as to defy explanation, or were not definite. The author recommends limiting the size between 500 and 5,000 sq. ft.—smaller is not worth while, larger implies commercial gardening. But why should victory gardens receive free water and not free fertilizer, seeds, etc.?[A36]

Approach Piping On Large Meters

Tests of the effect of approach piping connected to 4" and 6" turbine-type meters indicate that the arrangement of such piping may have considerable effect on the accuracy of registration; which can be kept within generally accepted limits by introduction of the regular trap at the meter inlet. The effectiveness of the trap may be lessened by destruction of the strainer by corrosion. But traps are not needed if the approach pipe is in line with the meter and straight for some distance—probably at least 20 pipe diameters.[A41]

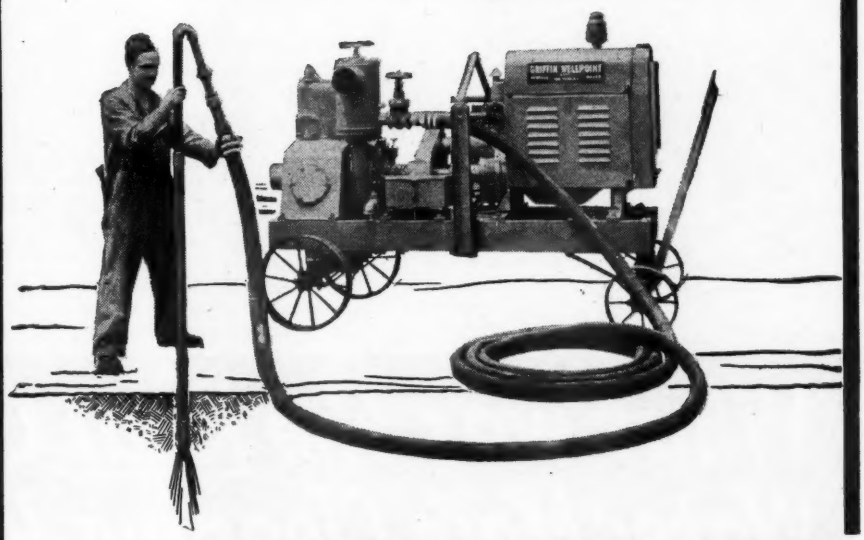
An Air-Operated Iron-Pipe Cutter

Columbus, O., had to remove and relay 4,500 ft. of 12" cast iron pipe, and to do so cut it into sections 42 ft. long. The cutting was done with a Strickler ratchet pipe cutter, but it took four men, working in relays, 2 hrs. to a cut. To lessen the time and labor, the engineer of the Div. of Water devised a scheme whereby one man made a cut in 17 minutes. A gear and pinion from a horizontal gate valve was bolted to the rear of a service truck and operated by power furnished by a 105 cfm portable air compressor through a pneumatic wrench ordinarily used for operating large valves. An arm extending from the gear crank pin to the hand lever of the cutter worked this back and forth as the gear revolved.[G10]

Water-Borne Spread of Poliomyelitis

"Although a theory of water-borne spread for poliomyelitis can be hypothecated, such a theory is not in accordance with the known biologic behavior of spread of the disease, which is distinctly different from that of other diseases sometimes known to be water-borne. There is at present no epidemiological evidence that permits the belief that water is of any importance in the spread of poliomyelitis."[A31]

IT JETS POINTS IN



...and DRIES THE JOB!

Many small construction jobs can be dried with a one pump wellpoint system but an *additional* jetting pump is needed to install the wellpoints. The *rental* charge for the jetting pump is nominal but the *freight* cost runs into *real money*—particularly the return ride at LCL rates. The way to save this expense is the JET'N DRY wellpoint pump. Use it first for *jetting* then hook it to the wellpoint system and *dry* the job. If you need a larger capacity you can *boost* the volume of the Model 64 pump from 650 gpm to 1700 gpm by a simple mechanical change made right in the field. This means an actual saving of round trip freight and rental cost of one pump. No other pump has this convertible feature.

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Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p.* paper before a society (complete or abstract); *t*, technical article.

A *Journal, American Water Works Ass'n.*

February

34. Engineering and Water Works Practice. By Paul Hansen. Pp. 127-133.
35. California State Employees' Retirement Act and Its Effect Upon Municipal Water Utility Employees. By Carl K. Chapin. Pp. 134-140.
36. Victory Garden Rates and Problems. By C. P. Harnish. Pp. 141-150.
37. Some New Features in the Design of Vertical Flocculation Units. By Charles Gilman Hyde and Harvey F. Ludwig. Pp. 151-162.
38. Resistance Coefficient Calculation From Incremental Flow Measurement. By Ross E. Thompson. Pp. 163-168.
39. Ground-Water Investigations in Florida. By H. H. Cooper, Jr. Pp. 169-185.
40. Emergency Chlorination Program in Los Angeles County. By C. W. Sopp. Pp. 186-189.
41. Effect of Approach Piping on the Accuracy of Water Meters. By L. F. Moullet and H. A. Knudsen. Pp. 190-197.
42. Experiences of a Lady Water Works Chemist. By Sara K. Philhower. Pp. 198-200.
43. Report of the Committee on Waterworks Practice. Pp. 201-209.
44. Drinking Water and Sanitation Standards. Pp. 213-224.

D *The Surveyor*

January 7

8. *p.* Maidstone's New Water Resources. By Charles H. Harden. Pp. 3-4.

January 14

9. *p.* Water Engineering After the War. Discussion of D5. Pp. 17-18.
10. *p.* Maidstone's Chalk and Greens and Waters. Discussion of D8. Pp. 23-24.

February 11

11. Britain's Water Supplies: Are They Too Hard? By Delwyn G. Davies. Pp. 63-64.

February 25

12. *p.* Training of the Young Water Engineer. By H. R. Davenport. Pp. 87-88.
13. *p.* Methods of Training the Young Engineer. By J. F. Bailey. Pp. 88-90.

F *Water Works Engineering*

February 23

12. Michigan Is Planning Actively For Its Postwar Water Supply. Pp. 180-182.
13. Wooden Tank on Concrete Tower Used for War Plant. P. 182.
14. Unaccounted-for Water Run Down at Penn Yan, N. Y. P. 185.
15. Removing Suspended Material. Pp. 187-188.
16. U. S. Supreme Court Approves Changed Utility Rate Base. Pp. 189, 204.

March 8

17. Fifty Years of Cast Iron Pipe. By W. R. Conard. Pp. 234-237.
18. Handling Treatment Chemicals. Pp. 243, 264.

G *Water Works & Sewerage*

February

10. *c.* Compressed Air Speeds Pipe Cutting. By A. M. Edwards. P. 56.
11. Maintenance of Water Wells. By N. E. Gunderson. Pp. 69-71.
12. Is Water Main Cleaning Good Economy? By Jas R. Brown. Pp. 72-74.

J *American City*

March

7. Making Submarine Mains Reliable. By F. J. Reney. P. 45.
8. Wartime Water Rates. Pp. 77, 79.

L *Civil Engineering*

February

1. A Simplified Solution for Equivalent Pipes. By Quintin B. Graves. Pp. 71-72.

M *Water and Sewage*

February

3. *p.* Operation and Maintenance of Well Water Supplies. By Herbert S. Grove. Pp. 25-26, 40.
4. Bacteriological Examination of Chlorinated Water. By Rudolph E. Thompson. Pp. 27-28, 40-46.

P *Public Works*

March

15. Superchlorination of Missouri River Water. By Raymond F. Bishop. Pp. 11-12.
16. How Clayton Reduced Its Water Loss By Two-Thirds. By Manson Edmonson. P. 18.
17. Williston's Mobile Water Intake. By W. H. Robinson. Pp. 21-22.
18. How Tampa Remedied Negative Pressure in Water Mains. P. 30.

V *Journal, Maine Water Utilities Ass'n*

March

2. *c.* Unusual Subaqueous Pipe Repairs. By Harry U. Fuller. Pp. 35-38.
3. Treatment of Water in Submarine Mains in Portland. By Harold B. Scales. Pp. 39-41.
4. Typhoid Fever Death Rate in Maine. By James M. Caird. Pp. 49-50.

W *Johnson National Drillers Journal*

January-February

2. Testing Wells for Capacity. Pp. 1-7.

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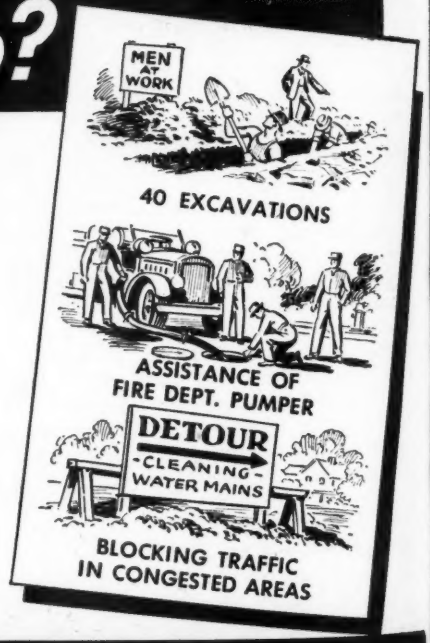

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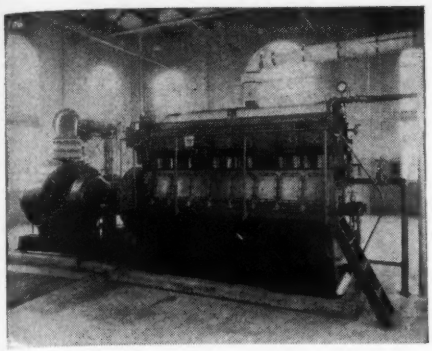


Gas engine direct connected to blower at Madison, Wis., sewage plant.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Waste From Rubber Plants

The Akron, O., treatment plant was designed for 33 mgd, the flow in 1938 was 36.3 mgd, and 58 mgd in 1943. Also the design was for a solids load of 25.4 tons per day, but it was 86.4 tons in 1943. A large part of the increase is due to discharges from rubber reclaiming and synthetic rubber plants. During a rubber plant strike in May 1943 the suspended solids in the sewage dropped from 339 ppm to 180. The waste particles from the synthetic rubber plants have a specific gravity just below 1 and will not settle; some pass through the entire plant, including the sprinkling filters, and are found in the final effluent.[C16*]

Sludge Elutriation At Marion, Indiana

Tests at the Marion plant, with a view to lowering cost of vacuum filtration, showed the possibility by use of elutriation, of reducing the ferric chloride dose from 1.8 to 1.51% and the lime from 13% to 8.6%, and the cost from $1.94 per ton of solids removed to $1.42, and reducing the trouble from lime scale and cloth binding 50%. But constructing an additional tank for elutriation was impracticable now, and the secondary digester was used as follows: Sludge was pumped from the bottom of the primary digester to the secondary digester through a 6" pipe while cold water from a stone quarry was pumped into the same pipe, sludge at the rate of 50 gpm and water at 110 gpm. The sludge in the primary digestion tank is kept at 95° and its capacity gives a digestion period of about 18 days. Mixed with the cold water, the sludge has very little tendency to continue gasification, and the solids settle rapidly, leaving a clear supernatant. During a typical day's operation, 25,000 gal. of raw sludge is added to the primary digester; 25,000 gal. of sludge is transferred from the primary to the secondary digester at a 50 gpm rate, 56,000 gal. of water being added at the same time; and 81,000 gal. of supernatant is withdrawn from the secondary digester.

During February, March and April, 1943, the city sold the digested thickened sludge in liquid form for fertilizer, delivering it in a cypress tank holding 930 gal. which it sells at $1.00 to $2.50 per tank full, depending on length of haul. It is generally delivered onto the ground through a hose as the tank is driven slowly over the ground.[C18*]

Longitudinal Mixing In Aeration Tanks

Spiral flow utilizes the energy of aeration very efficiently, but only with careful designing is this energy distributed uniformly over the entire cross-section of the tank. Only a small amount of it may be exerted in the central region, which central quiescence may preclude proper oxidation and may cause short circuiting, causing undertreatment and rapid passage of some of the mixed liquor, possibly including pathogenic organisms. Short circuiting may be overcome by proper design, especially in the shape of the cross-section and location of diffusers or paddles.

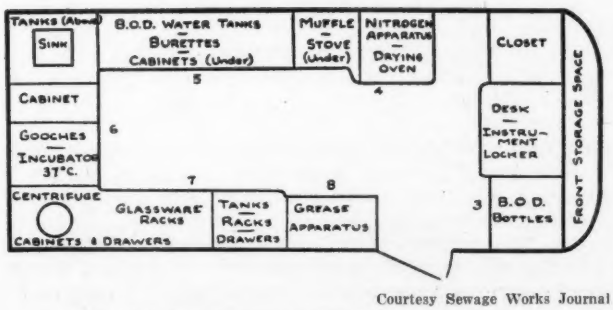
The effects of longitudinal mixing assume added significance when it becomes necessary to treat slugs of toxic or septic wastes, when considerable longitudinal mixing may be desirable to distribute this shock load evenly throughout the tank. Some particles travel upstream and downstream within the tank or between baffles many times before being carried away in the effluent.

The full development of the potentialities of tapered aeration awaits a more complete generalization of the laws of longitudinal mixing. An understanding of longitudinal mixing is important in the development of "step aeration" or "distributed loading," in which sewage is added to mixed liquor at various points along the tank. Baffles may be used to control longitudinal mixing, but too many baffles may be undesirable, especially if improperly spaced.

Investigation leads the authors to believe that the effects of the various factors influencing longitudinal mixing may be formulated in a rational manner. The factors studied include the degree of turbulence, the mean velocity of flow, the length of the tank, the number of baffles, and the degree of constriction at the baffles. A theory of mixing has been developed which may be applied toward a better understanding and control of the activated sludge process, particularly in relation to problems brought about by toxic wastes, pathogenic bacteria, and bulking of sludge. The need for baffles is indicated especially in designs employing tapered aeration or distributed loading.[C28]

Analyzing Camp Sewage

Some treatment plants at Army camps are too small to warrant the installation of a complete laboratory with a qualified chemist. Sending samples to a central plant is satisfactory for water analyses but not for sewage. The Army uses a portable laboratory built in a trailer 6½ ft. wide by 15 ft. long. A sedan was equipped with special springs and a strengthened clutch. Apparatus was provided for making the following analyses: B.O.D., O.C., D.O., relative stability; suspended, settleable and total solids; volatile and ether-soluble matter; nitrates, nitrites, ammonia, organic and total nitrogen; pH; alkalinity, acidity, hardness; B coli and total bacteria; microscopic and gas analyses. Water and electric power are obtained by connections to plant outlets. The service performed by this laboratory has been most satisfactory.[C29]



Courtesy Sewage Works Journal

Floor plan of laboratory in the 6½ ft. by 15 ft. trailer.

High-Rate Trickling Filters

A plant constructed for Armp Post 7 in 1940-41 included a communitor, control-section meter, grease-skimming tank with diffused-air aerators, Imhoff tanks, 2 high-rate trickling filters with rotary distributors, 3 return sewage pumps, 2 final settling tanks with sludge collectors, 12 acres of intermittent sand filters and 2 acres of sludge drying beds. There was no water course nearby to receive the effluent and it percolates into the ground under the sand filters. Design population, 30,000; design flow, 3 mgd average, 6 mgd maximum; but the population served has been as high as 43,000, and the flow has been lowered to 50 gcd. The suspended solids content of the raw sewage has been about 0.125 lb. per cap. per day, less than was expected. The B.O.D. has been about 0.175 lb., the basis of design.

The efficiency of the plant has been affected materially by the number and experience of the operating personnel. Based on monthly operating records, removal of suspended solids has varied from 70% to 90%, and of B.O.D. from 75% to 91.2%. Prior to April 1943, clarified sewage and settled solids from the final tanks were returned together to the mixing chamber ahead of the grease-skimming tanks, maintaining a uniform flow through the plant. Since then, final tank effluent has been returned directly to the trickling filters but the settled solids from the final tanks have been pumped intermittently to the Imhoff tanks; this method giving better results. During the summer of 1943 the B.O.D. load on the filters has varied from 4.2 to 5.3 lb. per day per cu. yd. of stone. (Design basis, 3.4 lb.). Recirculation ratio was designed as 1.5, but as the flow diminished this has ranged from 3 to 5.

Data from the military establishments indicate that sewage treatment design factors have been overconservative. As more results of operation become available, greater refinements in design will follow, so that plants can be designed for definite loads, using only normal safety factors, with reasonable assurance of their ability to handle such loads. For industrial wastes and sewage containing high concentrations of such wastes the high-rate trickling filter appears to have great possibilities.[C30]

Data show a marked relation between temperature and B.O.D. removal by high-rate filters, removal increasing with rising temperature; this relation is less marked in the Worcester, Mass., standard-rate filters. (At the Leominster, Mass., activated sludge plant, efficiency *decreases* with a rise in temperature.) If the high-rate filter is, as seems to be indicated, more susceptible to reduction in efficiency with falling temperature than is the standard-rate, this may be a factor in selecting plants in northern climates.[C32]

Neutralization of Acid Wastes With Limestone

Limestone beds for treating nitro-cellulose waste are simple to construct and require little control, but generally are made ineffective by deposits of calcium sulfate on the stone and must be large in area. Studies made with a view to eliminating these objectionable features led to the conclusions that acid wastes relatively free of solids can be neutralized continuously by up-flow application to beds of limestone gravel at rates of from 20 to 100 gal. per sq. ft. per min., 50 gal. yielding the most satisfactory results from several standpoints. Both amorphous and crystalline high-calcium limestone is suitable. The relations between acidity of waste, depth of bed and rate of application of waste are linear. The stone size range found in "No. 2 limestone chick gravel" was shown to be the most effective and is readily available. Wastes containing sulfuric acid acidities in excess of 5,000 ppm ($CaCo_3$) must be diluted prior to application to an up-flow bed. Wastes containing appreciable concentration of acid salts, such as copperas, are not neutralized at as high rates as other acid wastes. The common mineral acids respond very similarly to up-flow limestone bed treatment. This type of bed shows promise of providing neutralization with little supervision and control at a very low initial equipment cost.[C34]

Paying for Postwar Public Works

In Maryland, municipal officials seem to be definitely of the opinion that "Federal funds in large doses will be available to pay for a large part of the construction costs of" postwar public works projects. In Mississippi "municipal officials . . . are interested in all financial assistance possible from Federal sources in their postwar planning programs." In Missouri "approximately 35% of the cities needing (sewerage) improvements do not have sufficient bonding capacity to finance such improvements." Sewage collection systems and treatment plants needed by Nevada cities would cost over $2,000,000, and "most of the cities are in a position to finance this work and they would probably do this by bond election." Most of New Hampshire cities and towns "are in position to finance costs (of needed treatment plants) through bonds issuance. If any Federal assistance will be forthcoming, doubtless advantage will be taken of this."[H15]

Canadian Sewerage Practice

The minimum size of sewer used in Canada is 8", 9" or 10", according to the preference of the designer. In general, where convenient storm water outlets are available, separate sewers are used; but the requirements for treatment plants has not induced widespread use of them. In some cases ground water infiltration has nullified the advantages of the separate system.

There are about 1,300 public waterworks systems in Canada, but only about 500 sewer systems and only 115 municipal treatment works, of which only 63 include secondary treatment.[E4]

Repairing a Digestion Tank

When emptied for repairs, one of Buffalo's four concrete sludge digestion tanks, 90 ft. diameter and 28 ft. side depth, was found to have numerous breaks in the 3" cast iron, threaded-joint heating coils. These were repaired by electric welding or cutting out a defective part and replacing it with a nipple welded in. Of two 8" cast-iron pipes through which the raw sludge entered, one was plugged solid with sludge and scum for its entire length and the other badly choked. It had been impossible to rod these, and new ones were so installed that they could be rodded from the outside.

Gas had been removed from the dome through a 4" cast-iron pipe, which would normally remove only about 150,000 cu. ft. a day, while the peak production of gas exceeded 350,000 cu. ft. This was replaced with a 6" pipe. Since the repairs, the gas delivered has been tripled, and it is possible to divert raw sludge flows of 200,000 gpd to it, where formerly it was difficult to distribute over 150,000 gpd, even with the lines to all four digesters open.[L8]

Porteous Process Of Sludge Dewatering

Several plants using this process have been installed in England, none in this continent, it is believed. Briefly, the process is as follows:

Wet sludge is passed through a disintegrator and pumped through a heat exchanger into a series of high-pressure heating vessels where steam heat is applied at about 360° F. After being sufficiently cooked, the sludge is passed through a heat exchanger, giving up its heat on the way to incoming cold sludge, so that the hot, treated sludge is cooled and the raw sludge arrives already heated at the heating vessels, and only a small amount of make-up heat is required.

The treated cooled sludge is settled in decanters where approximately two-thirds of the volume rapidly settles out as supernatant liquor, which is decanted off, and the residue,, being thickened sludge, is passed to a special storage tank through which it is pumped to a series of filter presses, in which the sludge is pressed into cakes having a water content of approximately 40%. These cakes will

dry rapidly in the open air and can be used either as a fuel or as a fertilizer if ground up.

A normal sludge so treated has a good calorific value, the average figure for perfectly dry cake being 9,000 to 9,500 B.T.U.'s per lb. In practice, it is not necessary to dry the cake to complete dryness to form a fuel, as it can be burned in a boiler furnace with as much as 30% of water with good results. It is recommended, however, that the cake should be dried down to about 15% water content to form a good fuel. As a fertilizer, it is sterilized and free from weed seeds.

Advantages claimed are complete disposal under all weather conditions, freedom from odors, no conditioning chemicals required, nor drying beds. The process requires sedimentation tanks and a filter press (vacuum if preferred), but claims that the heat alters the gel structure and reduces the water affinity so that the water can be separated out more readily and completely.[M4]

Oil Troubles in Springfield's Digestors

In the fall of 1941 the four digestion tanks at the Springfield, Mass., plant rapidly accumulated scum until it reached a depth of over 6 ft., largely due to petroleum oils and greases, non-saponifiables; although an average of 2,100 gpd of skimmings were removed manually from the primary settling tanks. As one remedy, two local laundries were shown the value of these oils as fuel if collected before reaching the sewer, and they collect over 4,000 gal. a week from garages, etc., paying one or two cts. a gallon for it. One large industry uses as fuel the 200 gpd it formerly wasted.

Another remedy was to use one digester for the tank skimmings only, little scum then collecting in the other three. These skimmings digest readily, the unsaponifiable contents forming a very fluid scum about 4 ft. deep, which is practically the same as No. 5 fuel oil. This is now being used as fuel in the plant, after being drawn off into a small tank and settling over night. About 200 gpd is being used in a burner normally using No. 5 oil, with no changes or adjustments.[G8]

Nitrates and Stream Flow

Previous attempts to correlate the quantities of nitrates found in surface waters with the degree of pollution have failed. Studies have been made of data collected during pollution surveys of the Raritan river and its tributaries between 1927, when none of the sewage was treated, and 1942, when all of the sewage and the bulk of the wastes were treated, and the conclusions reached from these were that the quantities of nitrates present are not dependent upon the degree of pollution, that the temperature of the water is of minor importance, that the quantities of nitrates are materially higher in winter than in summer, and that they can be correlated with the volume of water in the stream. The character of the drainage area affects the amount of nitrates present.[C37]

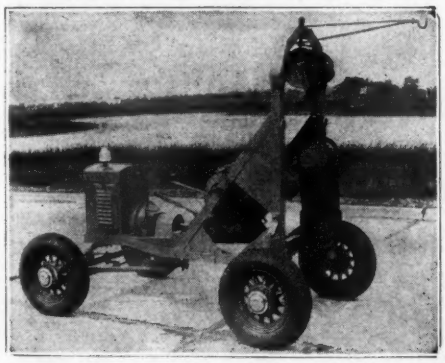
Lime for Digestion Tanks

In operating four digestion tanks at Greenwich, Conn., capacity 0.25 mgd to 2.5 mgd, three kinds of lime have been tried—unslaked, partially slaked, and completely slaked or hydrated. The last has been selected for use, low in magnesium content because this is less soluble than calcium and more apt to precipitate. The unslaked lime provides about 10% more calicum for the same cost than does the hydrated, but this is more than balanced by ease of application and saving of time by not having to slake it. (In large plants this might not be the case.)[C40]

Wire for Vacuum Filters

Of 8 plants, 4 use steel wire, one of them stainless steel, one hot-galvanized soft-tempered steel; one uses black iron and one galvanized iron; one uses copper and one hard drawn copper bronze. The last two originally used

KEEP THOSE SEWERS OPEN!



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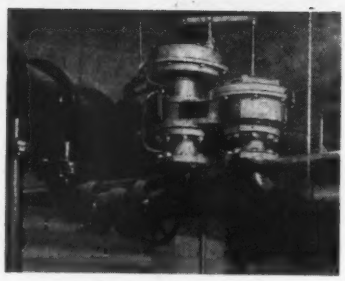

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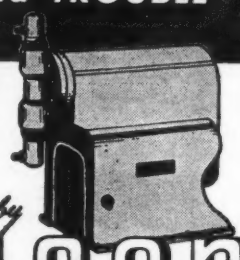

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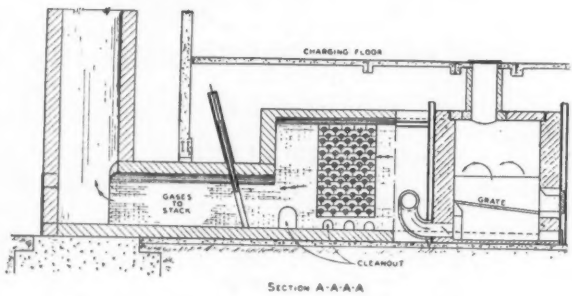

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iron but found it rusted and spoiled the filter cloths. Two plants use the wire for three windings, but further use is impossible because the wire is shortened too much by repeated fastening. A substitute for wire winding is thought desirable.[C41]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract), *t*, technical article.

C *Sewage Works Journal*

January

19. Priorities and the War Production Board. By Maury Maverick. Pp. 3-7.
20. Mechanics of Priorities. By A. M. Rawn. Pp. 7-10.
21. Priorities and the Manufacturer. By Frederick G. Nelson. Pp. 10-12.
22. Priorities and the Operator. By Don E. Bloodgood. Pp. 12-13,
23. Priorities Forum. Open discussion. Pp. 13-16.
24. Problems of Sewage Treatment Plant Operation Under Wartime Conditions. By W. W. Mathews. Pp. 17-24.
25. Wartime Problems of Sewer Maintenance. By John H. Brooks, Jr. Pp. 25-27.
26. Wartime Operating Problems—By the Dozen. By Morris M. Cohn. Pp. 28-29.
27. Effect of Addition of Nitrogen on Digestion of Paper Pulp. By Conrad P. Straub. Pp. 30-41.
28. Longitudinal Mixing in Aeration Tanks. By Harold A. Thomas, Jr. and Jack E. McKee. Pp. 42-55.
29. Analysis of Sewage in Army Camps. By Rolf Eliassen and H. B. Schulhoff. Pp. 56-64.
30. High-Rate Trickling Filters—Their Design and Operation. By Samuel M. Ellsworth. Pp. 65-75.
31. Experience With High-Rate Trickling Filters at Army Posts in New England. By G. E. Griffin and J. Raymond Snell. Pp. 76-79.
32. High-Rate Biological Sewage Treatment: A Discussion. By Frank A. Marston. Pp. 80-89.
33. Problems in the Design, Construction and Operation of Very Small Sewage Disposal Plants. By Frank L. Flood. Pp. 90-103.
34. Neutralization of Acid Waste Waters With an Up-Flow Expanded Limestone Bed. By Harry W. Gehm. Pp. 104-120.
35. Sewage Disposal Prospects in South America. By Edward J. Cleary. Pp. 121-123.
36. Conservation and Sanitation. By Robert F. Legget. Pp. 124-131.
37. Relation Between Stream Flow and Quantities of Nitrates. By Willem Rudolfs and H. Heukelekian. Pp. 132-138.
38. Preference Rating Order P-141; as of Jan. 5, 1944. Pp. 140-146.
39. Operation of Trickling Filters. By Frank Bachmann. Pp. 147-157.
40. Kinds of Lime Suitable for Use in Sludge Digestion Tanks. By Joseph Doman. Pp. 159-160.
41. Wire for Vacuum Filters. By John R. Szymanski. Pp. 165-166.
42. Plant Operation at Rockville Centre, N. Y. By C. George Andersen. Pp. 169-174.

D *The Surveyor*

January 14

8. *p*. Sewage Disposal in Rural Areas. By G. T. Cotterell. Pp. 15-16.

January 28

9. Sewerage and Sewage Disposal in 1943. Pp. 43-45.

E *Engineering New-Record*

March 9

4. *p*. Postwar Sewage Disposal Prospects in Canada. By A. E. Berry. Pp. 122-124.

G *Water Works & Sewerage*

February

7. Developments of the Year in Sewerage and Industrial Wastes. By A. M. Rawn. Pp. 39-48.
8. Solving Problems Caused by Oils in Sewage at Springfield, Mass. By John D. McDonald. Pp. 53-55.

H *Sewage Works Engineering*

March

14. *p*. Trends in Sewage Treatment. By Paul Hansen. Pp. 134-136.
15. Construction for Wastes Treatment: A Postwar Forecast. By George L. Hall, W. W. White, H. A. Kroeze, Charles D. Howard and W. Scott Johnson. Pp. 140-142.
16. Equipment Maintenance in Time of War. By Morris M. Cohn. Pp. 145-147.

J *American City*

March

5. Municipal Sewerage: The Unrecognized Ally. By John A. Hurley. Pp. 43-45.
6. Operating Refinements in Sewage Treatment at Springfield, Mass. Pp. 54-56.

L *Civil Engineering*

February

3. Sludge Digestion Tank Entered to Make Pipe Repairs. By J. W. Johnson. Pp. 72-73.

March

4. Nomographic Chart for Flow in Pipes Partly Full. By H. M. Gifft. Pp. 115-116.

M *Water and Sewage*

February

4. Sludge Dewatering by the Porteous Method. Pp. 17-20, 38.
5. *p*. Trends in Sewer Design. By W. L. Malcolm. Pp. 22-24, 46.

P *Public Works*

March

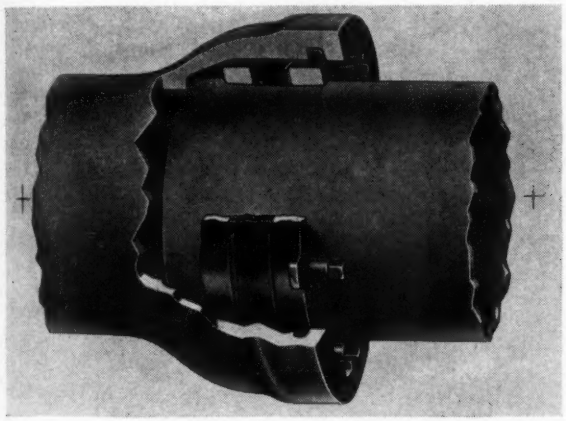
15. Dickinson's Waste Sewage Gas Burner. By E. A. Tschida. P. 13.
16. The Cyclo-Nitrifying Filter. Pp. 19-20, 40.
17. Hannibal, Mo., Changes Sewage Disposal Methods. By Geo. W. Farrell. Pp. 23, 42.

Keeping Up With New Equipment

Rotary Saw Breaks up Ice on Streets and Highways

Fred Gettelman Company, Milwaukee, Wis.

To an under-slung frame attached directly under the axles from front to rear of a truck, cross axles are attached. On those axles discs of approximately 36 inches in diameter are held above the pavement one inch or more as desired. They are pulled or towed through the packed ice and snow ruts and loosen the ice between the wheels and break up the so-called center dummy. The number of wheel saws that can be used depends upon the size of the truck. A one-ton truck can tow two or three crushing wheels, a two-ton truck will handle six crushers at speeds of 10 miles per hour and faster. This seems to offer an effective and comparatively inexpensive method of clearing streets and highways of ice formed by the packing of snow.



Dresser "All-in-One" Bellmaster Joint.

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Dresser Manufacturing Company, Bradford, Pa.

It is called the Dresser Bellmaster and is for use in Bellmaster cast iron pipe which cast iron pipe makers are able to furnish. The inner circumference of Bellmaster pipe is grooved to accommodate the locking lugs, and slots on the face of the bell permit lug passage. As shown in the cutaway illustration, the inner ring is made of high grade malleable iron cast in one piece. Outside is tapered to permit maximum joint deflection. Extra metal around tapped screw holes for strength and protection of screws. Capscrews are cold-upset from special steel and heat-treated for maximum strength. Double headed: square section for wrenching and large round section for extra protection against corrosion. Minimum ultimate tensile strength 100,000 psi., minimum yield point 60,000 psi.

The outer ring is made of high-grade malleable iron cast in one piece, tapered on outside to permit maximum joint deflection without metal bending or stressing. Locking lugs are cast integrally with outer ring. The lugs pass through "slots" in the bell face when the joint is inserted. The joint is then turned clockwise until one lug hits the stop in bell groove, preventing rotation of joint while capscrews are tightened. Compression of the resilient gasket between inner and outer rings and against the pipe by capscrews effects the permanently tight and flexible seal.

The manufacturers claim that the joint can be installed

JAEGER "Sure Prime"
— Pumps that Exceed Their Promises

The only pumps that, for years, have been individually tested and certified for vacuum, capacity, pressure and regularly exceed their guaranteed performance — with up to 5 times faster 100% automatic priming, high capacity under adverse conditions, thousands of hours of *extra* service. Self-cleaning shells, replaceable liners, longest life seal, oversize shafts — for high pressures, continuous heavy service.

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Where Wood Rots Rapidly

Stop the rot with CUPRINOL

For the flats and benches in municipal greenhouses, for cold frames, treat the wood with Cuprinol. It costs but a few cents to treat a flat—400 square feet coverage to the gallon of Cuprinol. Used successfully for 30 years in European greenhouses. Harmless to plants. Tested and now used by leading agricultural colleges here. Easily applied by brush, spray or dipping, wherever wood is subject to rot.

You can use Cuprinol. Ask us about it.

CUPRINOL, Inc., 24 Spring Lane, Boston 9, Mass.

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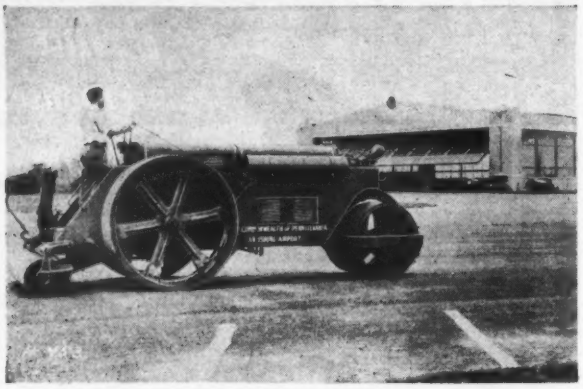
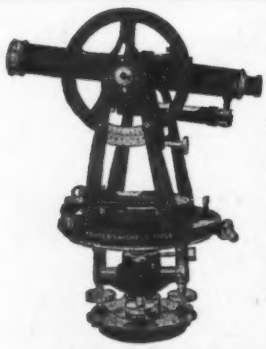


HERCULES Ironerollers

. . . with their smooth-working, time-and-labor-saving leveling action . . . are cutting costs daily on road construction and maintenance jobs. Likewise, many airports use this outstanding roller to provide smooth, hump-free surfaces essential to runways, aprons and landing areas.

THE HERCULES COMPANY
BUCYRUS, OHIO



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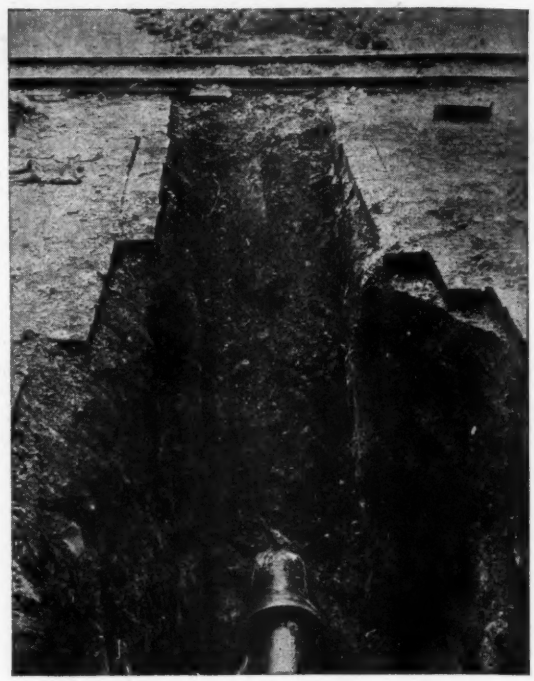
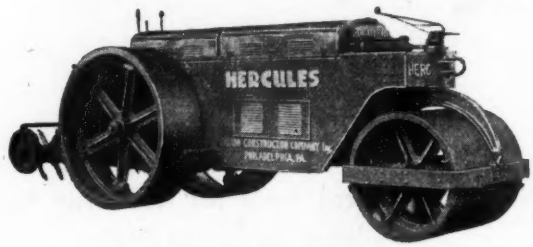


Dresser Bellmaster Joint absorbs shocks in cast iron pipe laid under tracks.

by ordinary labor in from 2 to 5 minutes in any weather; it is completely enclosed by a bell—no exposed parts to chip or break; practically corrosion-proof; only one tool required for installation—a ratchet wrench. On test installations, it is claimed this efficient joint has proven bottle-tight under remarkably severe conditions of compression. A folder giving full information will be sent upon request to the manufacturers.



Hercules Ironeroller.

W. A. Riddell Corp. Buys Hercules Co.

All manufacturing and sales rights to Hercules Road Rollers and Ironerollers, previously made and sold by The Hercules Co. of Marion, Ohio, have been acquired by W. A. Riddell Corp. of Bucyrus, Ohio. The new owners will operate under the name of The Hercules Roller Co.

The Hercules line of rollers was introduced in January, 1930. It marked a distinct departure from the prevailing designs, incorporating ball and roller bearings, steel castings, six-cylinder engines and three speeds forward and reverse. All of these have since become standard practice.

Later, the Hercules Ironeroller was introduced with considerable success. The Ironeroller comprises a third roll, flexibly mounted at the rear of the roller, for leveling off high spots in road surfaces. It is interchangeable with the scarifier.

The Riddell organization plans to produce Hercules Rollers as soon as practicable and is pleased to announce that Carl G. A. Schmidt, Jr., manager of sales for the Hercules Co., has become associated with them in the same capacity, and will cooperate in the sale of their lines of

Hydraulic Control Motor Graders, Hydraulic Scoops, Maintainers, Terracers, Rotary Scrapers, etc.

The Hercules Roller Co. will supply replacement parts for all Hercules Rollers now in the field and expects to continue the distribution of Hercules Rollers through most of the large group of eminent distributors, at home and abroad, established by Mr. Schmidt, as well as through many Warco distributors. Further information may be had by writing The Hercules Co., Bucyrus, Ohio.

Stabinol for Soil Stabilization

Hercules Powder Company, Wilmington, Delaware

After several years of laboratory and field tests with various resin compounds, this company announces Stabinol as a soil stabilizer. It is claimed that by mixing Stabinol, with the top few inches of soil, a waterproof surface is obtained. The water will drain off or evaporate, rather than seep through the treated soil, and the stabilized soil will resist the penetration of water by the capillary rise of moisture from below. It is recommended for stabilizing unsurfaced dirt roads in rural areas where the traffic is light or for mixing with soil that serves as a base on main highways with hard wearing surfaces.

Usually about 1% of Stabinol, that is—1% of the total soil to be treated, is required and it is claimed that roads laid down more than five years ago stabilized with Stabinol are still waterproofed. Hercules says that resin-stabilized roads have been put down in Delaware, Florida, Georgia, Mississippi, Ohio, and South Carolina with the cooperation of city and state highway departments and Stabinol has been used on Navy Department projects in Florida, Mississippi and South Carolina. It is not claimed that Stabinol will increase the load-bearing capacity of soil, but prevents the soil from getting wet and thereby losing its strength.

William J. Orchard Doubly Honored

Receives Citations from Belleville Manufacturers Association and Chamber of Commerce and Civics of the Oranges and Maplewood.

On December 7, 1943, the 12th anniversary of the Belleville Manufacturers Association, Inc. of Belleville, N. J., Mr. Orchard was cited for his services to management and labor in that community during World War II. In the citation it was stated that his work had been of paramount importance to the economic, industrial, and civic life of that area. Mr. Ochard organized the Community Manpower Committee to help solve the labor needs of the Newark area of the War Manpower Commission. The area comprises the counties of Essex, Hudson and Union in New Jersey. Mr. Orchard was the chairman of the committee and actively directed its work and the results produced have earned praise from high government officials; war production in the area was increased; labor turnover decreased; and thousands of new people have gone to work in the war industries.

William J. Orchard

Mr. Orchard also received a citation from the Chamber of Commerce and Civics of the Oranges and Maplewood (his home town) for his many civic activities and his work in the furtherance of the war effort. This citation was presented at the annual dinner of the Chamber at the Hotel Suburban, East Orange, New Jersey, on February 15th by Common Pleas Judge Brennan.

Mr. Orchard, a graduate of the Massachusetts Institute of Technology, is General Manager of Wallace &

WHEN THERE'S NO TIME FOR BREAKDOWNS IT'S TIME TO GET A GORMAN-RUPP PUMP

Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders—you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog—no shut-off valve to jam—no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stocked for immediate delivery in 100 principal cities.

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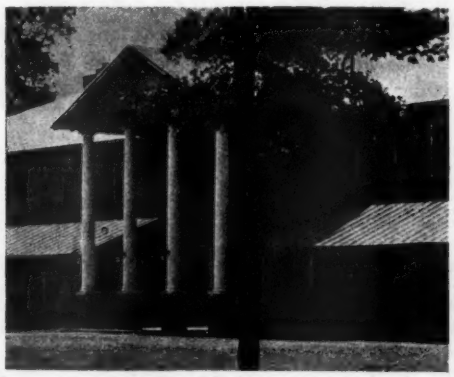
THE GORMAN-RUPP CO. Mansfield, Ohio



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TODAY, more than ever before, our friends and guests are depending on regular week-ends at this famous Spa to keep themselves fit for war-time duties.

After a period of exhausting, nerve-wracking incidents in your business, you need a few days at the Park spent in rest, relaxation and Spa baths in famous Magnetic Spring Water.

Our record speaks for itself—over sixty years of enviable service with 5,000 patrons—some families coming in the third generation—Magnetic Spring Water, the only medicinal water of its kind in the world—and served to Park Hotel guests only.

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CUT MAINTENANCE COSTS 75%

Concrete slab maintenance costs can be reduced as much as 75% by the Koehring Mud-Jack Method. The Mud-Jack raises sunken concrete walks, curbs and gutters, driveways, streets, and airport runways eliminating reconstruction costs. Write for the new Mud-Jack Bulletin which is both illustrative and descriptive.

KOEHRING COMPANY
Milwaukee, Wisconsin

MUD-JACK METHOD

CUT *Installation* **TIME & COST**

This standard B&S cast iron pipe can be laid with unskilled labor because the joints are factory made.

The lead and redwood wedges are already in the pipe bells. No lead to melt and pour. No skilled labor. Just "socket the spigot and calk." And how that cuts installation time and costs!

ALL SIZES
1¼" thru 12"

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McWane PRECALKED Pipe

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Tiernan, Inc., President of Wallace & Tiernan Products, Inc., Vice President and Treasurer of the Novadel-Agene Corporation and a director of several Wallace & Tiernan subsidiary companies.

Robert N. Clark Promoted

Major Robert N. Clark, Sn. C., stationed in headquarters, 1st Service Command, Boston, Mass., has been promoted to Lt. Colonel.

Baker Heads American Public Works Association Planning Committee

Michael Baker, Jr. of The Baker Engineers, Rochester, Pa., has been appointed Chairman of the Planning Committee of the American Public Works Association for the year 1944. His appointment was announced by Frederick R. Storrer, President of the Association.

Michael Baker, Jr.

In accepting the appointment Mr. Baker, whose organization is now doing the engineering design and survey work on the $20,000,000 Penn-Lincoln Parkway in Pittsburgh, stressed the immediate necessity of planning postwar public works as "one of the most important functions of planning which any level of government faces today."

"I am fully aware that physical planning of the community, in relation to postwar planning, is the fundamental basis on which all immediate planning for postwar public works should be constituted. I do not feel that communities should enter into piecemeal designing or planning of public works until sufficient study has been given and plans made for a long-range program, into which all designing and construction will fit for the systematic growth and development of the community and its environs. Economic public service can only be provided by such planning and programming of public works. This is necessary if the postwar period construction is to be a part of the permanent and proper physical development of the individual community."

S. F. Newkirk, Jr.

L. N. Thompson

Wm. W. Brush

New A.W.W.A. Officers

Elected March 1st to Take Office at the Close of the Milwaukee Conference on June 16, 1944.

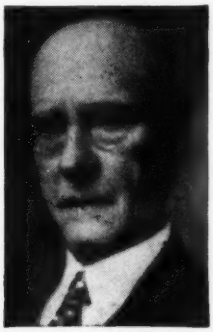
Samuel F. Newkirk, Jr., President. — Engineer and Superintendent, Board of Water Commissioners, Elizabeth, N. J. Graduated from Pennsylvania State College in 1913 with degree of B.S. in Civil Engineering; degree of Civil Engineer conferred by same institution in 1918. Member of American Society of Civil Engineers and New England Water Works Association. Mr. Newkirk's wide experience includes that of Engineer for the Town of Montclair, N. J., in charge of water supply and sewerage for Muscle Shoals, Ala., consulting engineer with C. H. Watson and Nicholas S. Hill, Jr. He was Engineer and Superintendent for Elizabethtown Water Co. Consolidated and has been Engineer and Superintend-

ent of the Board of Water Commissioners, Elizabeth, N. J., in charge of operation, maintenance and additions to the physical plant since 1931.

Leonard N. Thompson, Vice Pres.—General Superintendent and Engineer, St. Paul Water Department, St. Paul, Minn. Graduated from Ripon College, Ripon, Wis., 1911. Prior to his appointment as General Superintendent and Engineer, Mr. Thompson had been Designing and Construction Engineer for the St. Paul Water Department from 1920 to 1928 during which time he designed the filter plant, softening plant, reservoirs and supply conduits. Member St. Paul Engineers' Society, Minnesota Association of Professional Engineers (Past President), Past President Minnesota Section of A.W.W.A.

William W. Brush, Treasurer.—Editor; B.S., C.E., M.S., New York University; Engineer, Brooklyn Water Dept., 1894-1907; Engineer, New York Board of Water Supply, 1907-1934; Chief Engineer, 1927-1934. Editor —Water Works Engineering, 1934- . Member American Society of Civil Engineers; American Public Health Association; New England Water Works Association (Honorary).

John J. McKague



J. W. Fleet

Pittsburgh Equitable Meter Loses Two Members of its Sales Staff by Death

J. W. (Jack) Fleet, a veteran on the Sales Staff of Pittsburgh-National Meters died suddenly on March 2, 1944 at his home in Brooklyn, New York. For over 15 years he served as Sales Manager for the National Meter Company, and during recent years has been District Manager in Brooklyn for the combined Pittsburgh-National organization.

John J. McKague, long time National Meter salesman, passed away February 16, 1944. Mr. McKague spent his entire business career with the same organization, starting as a young man in the office. Since 1917 he covered the Eastern Seaboard until the illness of several months' duration which preceded his death. He had completed 40 years of service on February 13, 1944. He was a member of the Elks Club and 4th Degree Knights of Columbus.

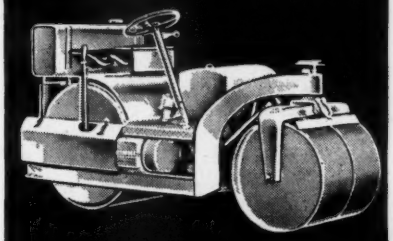
Builders and Omega Agency Changes

Builders-Providence, Inc. of Providence, R. I. and Omega Machine Company of Kansas City, Mo., affiliated companies, announce that on and after March 1, 1944, W. D. Taulman & Associates, 610 Red Rock Bldg., Atlanta Ga., will handle the products of both concerns for water and sewage works applications in Eastern Tennessee and in the states of Alabama, Florida, and Georgia. The Florida office is located at 1463 Talbot Ave., Jacksonville, Fla. This office is under the supervision of C. L. Timmons.

Mr. Evans L. Shuff, 412 Title Bldg., Atlanta, will continue as Builders "Industrial" representative and starting March 1 will handle the sale of Omega products for power plant and Industrial applications in Georgia, Alabama, Florida and all of Tennessee.

John R. Purser Sales Engineers, Inc., of Charlotte, N. C., continues to handle Builders line of flow meters, flow controllers, liquid level gauges, etc. and now adds the Omega line of gravimetric and volumetric dry chemical feeders for all applications in North and South Carolina.

C. H. & E. CONSTRUCTION EQUIPMENT



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Airport Radio Traffic Control

5. "Highways of the Air" is a new and valuable booklet available for engineers and officials interested in radio traffic control for airports. Illustrated and non-technical. Address: Radio Receptor Co., Inc., 251 West 19th Street, New York 11, N. Y.

Cold Mix Plants

15. New catalogs and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Concrete Curing

33. 64-page manual of concrete curing with calcium chlorides. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

Concrete, Early Strength

38. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types. From 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Graders, Patrol

105. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Road Machinery Co., Aurora, Ill.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee, Wis.

Oil, Motor

109. "Here's Proof of Ring-Free Superiority," 32 pages, illustrated, outlines the principles of lubrication and explains how by simple tests you can measure the advantages of Macmillan Ring-Free Motor Oil. Write Macmillan Petroleum Corp., 530 West 6th St., Los Angeles, Calif.

Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures. 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York, N. Y.

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

125. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

126. "Humdinger" 2- to 8-inch self-priming portable pumps. A 23-page illustrated booklet giving full details. Address: Ralph B. Carter Co., Hackensack, N. J.

Road Building and Maintenance

128. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

Rock Drill Maintenance

130. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland, Ohio.

Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio.

139. "Ironeroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. The Hercules Roller Co., Bucyrus, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Road Mach. Co., Aurora, Ill.

Rotproofing

145. Cuprinol, a rotproofing chemical that protects wood from fungi and insects, yet has no offensive odor, is non-poisonous, does not corrode metal and can be painted over. Get full details in booklet from Cuprinol, Inc., 7 Water St., Boston, Mass.

Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 24 pages. Sent by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing the steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Div., 40 Rector St., New York, N. Y.

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

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188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich., for Bulletin No. 29.

Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia 7, Pa.

Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York.

Street and Paving Maintenance

290. "Blacktop Road Maintenance and Construction Equipment" — Asphalt and tar kettles, flue type kettles, spray attachments with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. These are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, O.

Fire Apparatus

300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

Snow Fighting

Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Ice Control

351. "Make Icy Highways Safe for Traffic"—a new bulletin by Michigan Alkali Div., Wyandotte Chemicals Corp., Wyandotte, Mich., tells how to use calcium chloride for modern ice control.

Sanitary Engineering

Aero-Filter

356. Aero-Filter Design Data is given in a new 32-page catalogue. It contains information on Advantages of Aero-Filter Process, Single Stage vs. Multi Stage Treatment, Filter Loadings, Rates of Flow and Results, Filter Depths, Recirculation, Sewage Pumps and Pump Control. Approximately 15 pages of blue prints are included in this instructive catalogue. Write Lakeside Engineering Co., 222 W. Adams St., Chicago, for a copy.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

358. Air Valves are the subject of Rensselaer Bulletin Q in which Air Release, as well as Air and Vacuum, types are described. Address: Rensselaer Valve Co., Troy, N. Y.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Activation and Aeration

367. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester, Mass.

Blowers

370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence, R. I.

Cleaning Water Mains

383. Water main cleaning by the National Method is title of 4-page folder describing methods and results obtained, with full data. National Water Main Cleaning Co., 30 Church St., New York 7, N. Y.

Cleaning Sewers With Own Forces

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Consulting Engineers

389. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

Feeders, Chlorine, Amonia and Chemical

392. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. % 96 Codding St., Providence, R. I.

394. Everson Sterelators for all kinds of chemical feeding in stationary and portable models are described in new bulletins issued by Everson Manufacturing Co., 214 West Huron St., Chicago 1, Ill.

399. Pulsafeeders. A flow-proportional liquid chemical feeder, reciprocating type, fluid motor driven. Operating parts completely isolated from the chemical being fed. Micrometer adjustment. For feeding against high or low pressure. Wilson Chemical Feeders, Inc., 211 Clinton St., Buffalo 4, N. Y.

Filters

402. How to increase the capacity of filters through use of Anthrafilt and complete data on use of Anthrafilt for filters and sludge beds is contained in a revised pocket Manual issued by Anthracite Equipment Corp. For free copy write H. G. Turner, State College, Pa.

Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 436.

407. Fire hydrants which are flood-proof, easy to operate and service are described in Rensselaer Bulletin W., formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Gas Holders and Digesters

411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill.

Gates, Valves, Hydrants

413. Gate, flap and check valves; floor stands and fittings. New catalog No. 34 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

415. See listing No. 436.

416. Check valves of the Clear-Way, Quiet-Closing type which eliminate "Slam" are described in Rensselaer Bulletin V. Made in expanding outlet type, as well as straight-thru type, for bolting direct to pump discharge. Address: Rensselaer Valve Co., Troy, N. Y.

417. Rensselaer Gate Valves of high tensile strength, corrosion resistant iron are described in Rensselaer Bulletin X. Address Rensselaer Valve Vo., Troy, N. Y.

Gauges

421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Laboratory Equipment

423. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore, Md.

Leak Finders, Water

425. "The Answer to Your Water Leak Problem" is title of 8-page illustrated booklet issued by S. F. Ferguson, 11 Hill St., Newark 2, N. J.

Manhole Covers and Inlets

429. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend, Ind.

Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

Meters, Water

434. Six types of iron case cold water meters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh, Pa.

Pipe, Cast Iron

435. Handbook of Universal Cast Iron Pipe and Fittings, pocket size, 104 pages, illustrated, including 14 pages of useful reference tables and data. Sent by The Central Foundry Co., 386 Fourth Ave., New York 16, New York.

436. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

437. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia, Pa.

Pipe, Lock Joint

440. Lock Joint Reinforced Concrete Sewer Pipe. Pressure Pipe, Culvert Pipe, Centrifugal Pipe and Subaqueous Pipe is described and illustrated in bulletins available from Lock Joint Pipe Co., Ampere, N. J.

Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

Pipe Joints, Water

443. Bellmaster Joints for simpler, faster, easier joining of cast iron pipe are illustrated in a new folder that gives full data on this self-contained mechanical joint. Write Dresser Mfg. Co., Bradford, Pa.

Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

Pipe Joint Compounds

446. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

448. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; alo sump and bilge pumps. Dayton-Dowd Co., Quincy, Ill.

Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis, Tenn.

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles 31, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill.

452. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

Meter Setting and Testing

454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Screens

456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

Sludge Drying and Incineration

458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 48 pages. Address: Morse Boulger Destructor Co., 205-P East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

460. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

463. Water Softening. The use of the Spaulding Precipitator to obtain maximum efficiency and economy in water softening is described in a technical booklet. Permutit Co., 330 W. 42nd St., New York 18, N. Y.

Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

477. All-steel Rotary Distributors, correctly designed for the small and medium sized sewage plants, are the subject of a new, well illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill. This booklet also covers distributors for various types of high-rate trickling filters.

478. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

481. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

483. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Preflocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

487. The complete line of Jeffrey equipment for water, sewage and industrial wastes treatment is illustrated and described in a handsome, new, 40-page catalog just issued by The Jeffrey Mfg. Co., 947-99 North Fourth St., Columbus 16, Ohio.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2433 Wolfram St., Chicago 18, Ill.

Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh, Pa., for free copy.

Valves (See Gates, Air Release, etc.)

Water Treatment

495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

496. "Use of copper sulphate in water treatment plants" titles informative booklet, with valuable data on chemicals, dosage, etc. Write Tennessee Corporation, Atlanta 1, Ga.

497. Ferri-floc Ferric Sulphate — a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, Ohio.

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Colonel Rockwell, President of Pittsburgh Equitable Meter Company and Merco Nordstrom Valve Company has resigned the Chairmanship of the Maritime Commission. His resignation was submitted when it became apparent that the shipbuilding program was "over the hump" and that his services must be devoted to the production of war goods manufactured in his company's several plants which have contributed heavily to the war program both in materials produced and in trained manpower that has been released to branches of the service. Over 600 of our workmen are now serving in some branch of the armed forces.

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CONVENTIONS

May 5-6—Montana Section, American Water Works Association, Bozeman, Montana.

May 17th. . . . New England Sewage Works Association, Hotel Kimball, Springfield, Mass.

June 13-16—American Water Works Association, Hotel Schroeder, Milwaukee, Wis.

Oct. 3-5. . . . Second Wartime Conference of the American Public Health Association, Hotel Pennsylvania, New York, N. Y.

Oct. 11-14—Federation of Sewage Works Associations, William Penn Hotel, Pittsburgh, Pa. The Pennsylvania Sewage Works Association will meet jointly and serve as host.

Oct. 17, 18 & 19—Southwest Section of American Water Works Association at Stephen F. Austin and Driskill Hotels jointly, Austin, Texas.

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ADVERTISERS

IN THIS ISSUE

Albright & Friel, Inc.	62
Alvord Budick & Howson	62
Atlas Mineral Products Co	37
Baker, Jr., Michael	62
Barrett Div.	29
Black & Veatch	62
Bogert, Clinton L.	62
Briggs & Stratton Corp.	67
Buck, Seifert & Jost	62
Buffalo-Springfield Roller Co.	45
Builders-Providence, Inc.	55
Cafe Monaco	58
Caird, James M.	62
Calcium Chloride Assn.	3
Carter Co., Ralph B.	47
Champion Corp	53
C. H. & E. Manufacturing Co.	61
Chester Engineers	62
Cleaver-Brooks Co.	3
Cuprinol, Inc.	57
DeWitt Hotels	44
Dorr Co., Inc.	27
Dow, A. W., Inc.	62
Fairbanks, Morse & Co.	31
Fitch Recuperator Co.	56
Flexible Road Joint Machine Co.	67
Flexible Underground Pipe-Cleaning Co.	52
Ford Meter Box Co.	66
Frink Mfr., Carl H.	61
Gannett, Eastman & Fleming, Inc.	62
Goff, William A.	62
Goodwin Engrg. Co., J. W.	62
Gorman-Rupp Company	59
Graver Tank & Mfg. Co.	10
Greeley & Hansen	62
Green Co., Howard R.	62
Griffin Wellpoint Corp.	51
Hercules Co.	58
Hill & Hill	62
Hotel Philadelphian	61
Industrial Chemical Sales Div.	4
Jaeger Machine Co.	57
Johns-Manville Corp.	1
Koehring Company	60
Layne & Bowler, Inc.	35
Littleford Brothers, Inc.	61
Lozier & Co., Wm. S.	62
Macmillan Petroleum Corp.	2
McWane Cast Iron Pipe Co.	60
Metcalf & Eddy	62
M. & H. Valve & Fittings Co.	5
Morse Boulger Destructor Company	40
Mueller Co.	43
Murdock Mfg. & Supply Co.	66
National Water Main Cleaning Co.	46
Pacific Flush Tank Co.	56
Park Hotel	58
Peerless Pump Div.	33
Pirnie, Malcolm	62
Proportioneers, Inc.	Front Cover
Radio Receptor Corp.	44
Rensselaer Valve Co.	46
Riddell Corp., W. A.	42
Robert & Co., Inc.	62
Roberts Filter Manufacturing Co.	40
Russell & Axon Cons. Engrs., Inc.	62
Simplex Valve & Meter Co.	33
Sirrine & Co., J. E.	62
Snell, Inc., Foster D.	62
South Bend Foundry Co.	65
Tennessee Corp.	40
U. S. Treasury Dept.	36
Wallace & Tiernan Co., Inc.	Back Cover
Ward LaFrance Truck Div.	9
Warren-Knight Co.	58
Weston, L. A.	40
Wilson Chemical Feeders, Inc.	60
Wood Co., R. D.	36